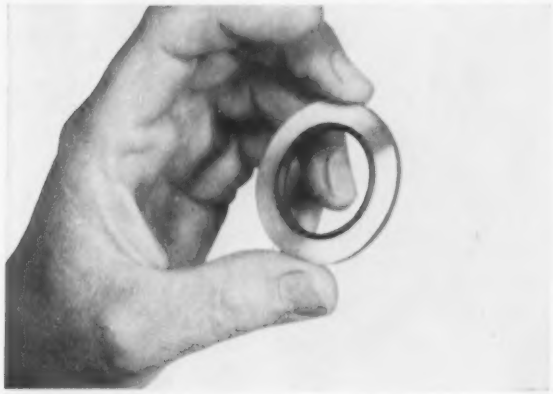
*News about*

# B.F.Goodrich Chemical *raw materials*

## * reduced milling time

## * Hycar meets aeronautical specs



**One of the new applications** *of Hycar American Rubber is this seal where Hycar is bonded to a steel washer. The rubber is thicker than the steel, thus when the seal is compressed the rubber provides leakproof sealing.*

**REDUCED HYCAR MILLING TIME WITH RESIN IN PLASTICIZER.** By adding small amounts of Geon* 101EP to liquid plasticizers, the milling time needed to disperse the plasticizer in Hycar stock is reduced. A combination of 10 parts of Geon resin 101EP with 90 parts of dioctyl phthalate has been found very satisfactory. The mixture should be heated to 280°F and stirred continuously until that temperature is reached. When the solution is cooled to room temperature it forms a gel.

In a test with a standard softener, 48 minutes were required for adding 30 parts of liquid dioctyl phthalate. With the Geon resin added, the total addition time was only 18 minutes, a reduction of over 60%. Further tests show that it is possible to add twice that amount of plasticizer within 18 minutes or less.

**HYCAR COMPOUNDS MEET AERONAUTICAL MATERIAL SPECIFICATIONS.** Continuing laboratory work is directed toward developing compounds meeting active aeronautical specifications. Several current specifications which have been met in their entirety are as follows:

**AMS 3202E** . . . requiring excellent resistance to dry heat, good oil resistance, and good low temperature properties. Typical applications: packings, bushings, grommets, seals. A Hycar 1002 formulation satisfies the specifications.

**AMS 3211A** . . . requiring good resistance to hot ethylene glycol-water mixtures, for packings and joint sealing compounds. A blend of Hycar 1042 and GR-S 1501 is entirely satisfactory.

**AMS 3215F** . . . requiring continuous or alternating exposure to both aromatic and non-aromatic fuels, for products such as gaskets, diaphragms, bushings, grommets, and sleeves. A Hycar 1042 compound meets the specification.

**AMS 7260** . . . requiring good resistance to fuels, plus flexibility at temperatures down to 65° below zero. A Hycar 1043 compound meets the standards; applications include gland type packings and flexible couplings.

**AMS 7270B** . . . properties required include fuel resistance, flexibility at −65°F, aging in hot oil, cyclic fuel aging, and dry heat aging, for sealing ring application. A Hycar 1042 formulation is satisfactory.

**AMS 7274C** . . . requiring maintenance of properties under extreme variations in temperature and exposure to hot oils, for sealing ring application. A Hycar 1043 compound meets all minimum values.

**AMS 3213F** . . . requiring maximum resistance to aromatic and non-aromatic fuels when continuously or alternately exposed to both, for applications such as gaskets, bushings, grommets, and sleeves. A Hycar 1042 compound meets all values.

**AMS 7271** . . . requiring service at temperatures to −65°F, with exposure to fuels, for sealing rings. Here a blend of Hycar 1042 and GR-S 1501 passes requirements.

For further information on Hycar nitrile rubber, write Dept. "D". B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ont.

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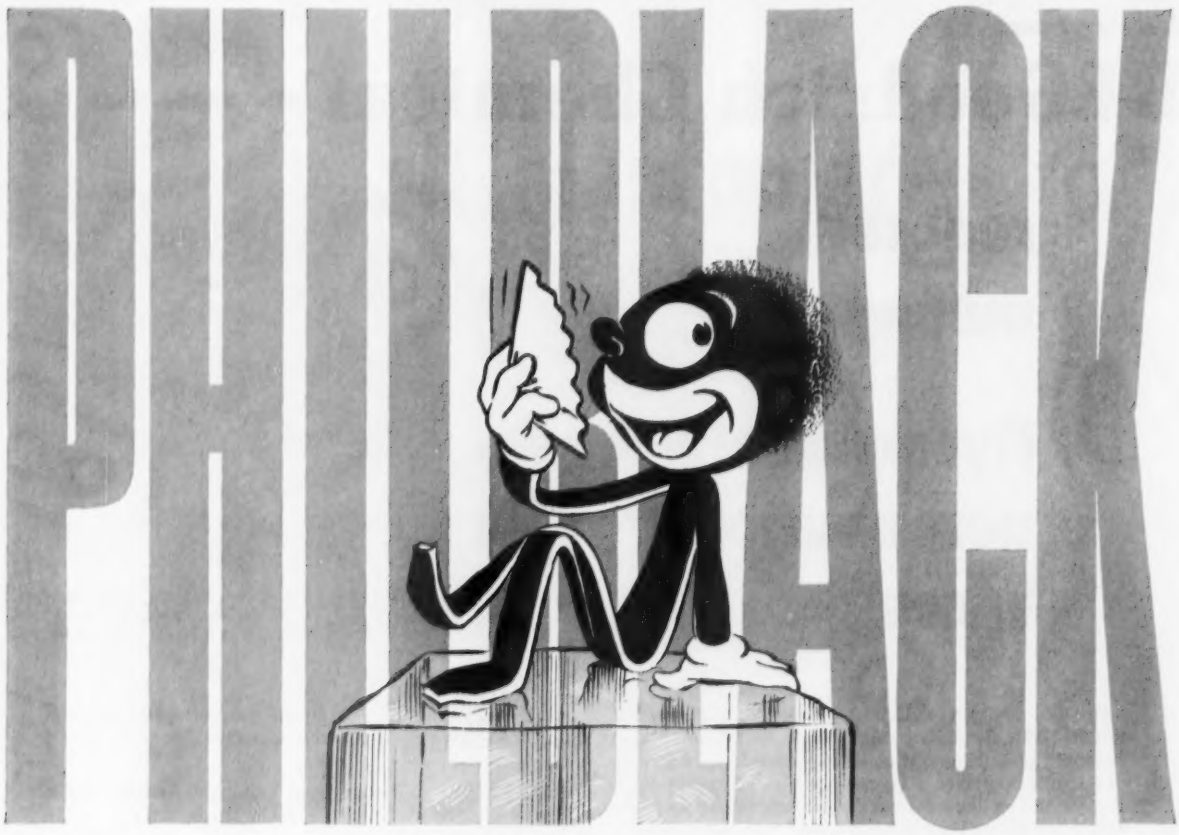


# Philblack* A dissipates heat!

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**PHILLIPS CHEMICAL COMPANY,** Rubber Chemicals Division, 318 Water St., Akron 8, Ohio. **District Offices:** Chicago, Providence and Trenton. **West Coast:** Harwick Standard Chemical Company, Los Angeles, California. Warehouse stocks at above points and Toronto, Canada. **Export Sales:** 80 Broadway, New York 5, N. Y.

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Photo courtesy Burlington Decorative Fabrics, Burlington Industries, Inc.

# New way to back a winner

Textile manufacturers have looked long and hard for a means of improving the performance of fabrics for upholstery, drapes, handbags and footwear. Many types of backing were tried, but most of these presented new problems—in reduced flexibility and resilience, high cost, objectionable odor, poor adhesion or lack of permanence.

Finally, one industry leader tried a coating based on PLIOLITE LATEX. Barely visible, this lightweight, odorless backing "muscles" fabrics in every direction. It helps them retain their shape, even after severe stretching—and reduces wrinkling. It also improves body and drape, with increased resistance to raveling, tearing or snagging. *And it's permanent!*

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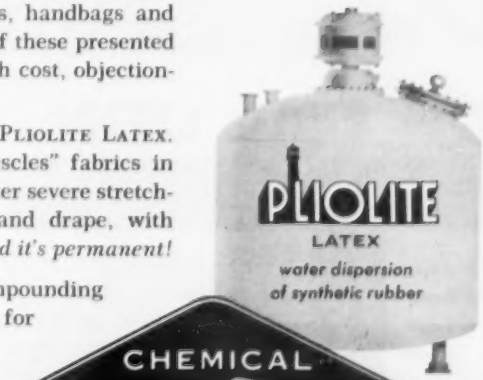


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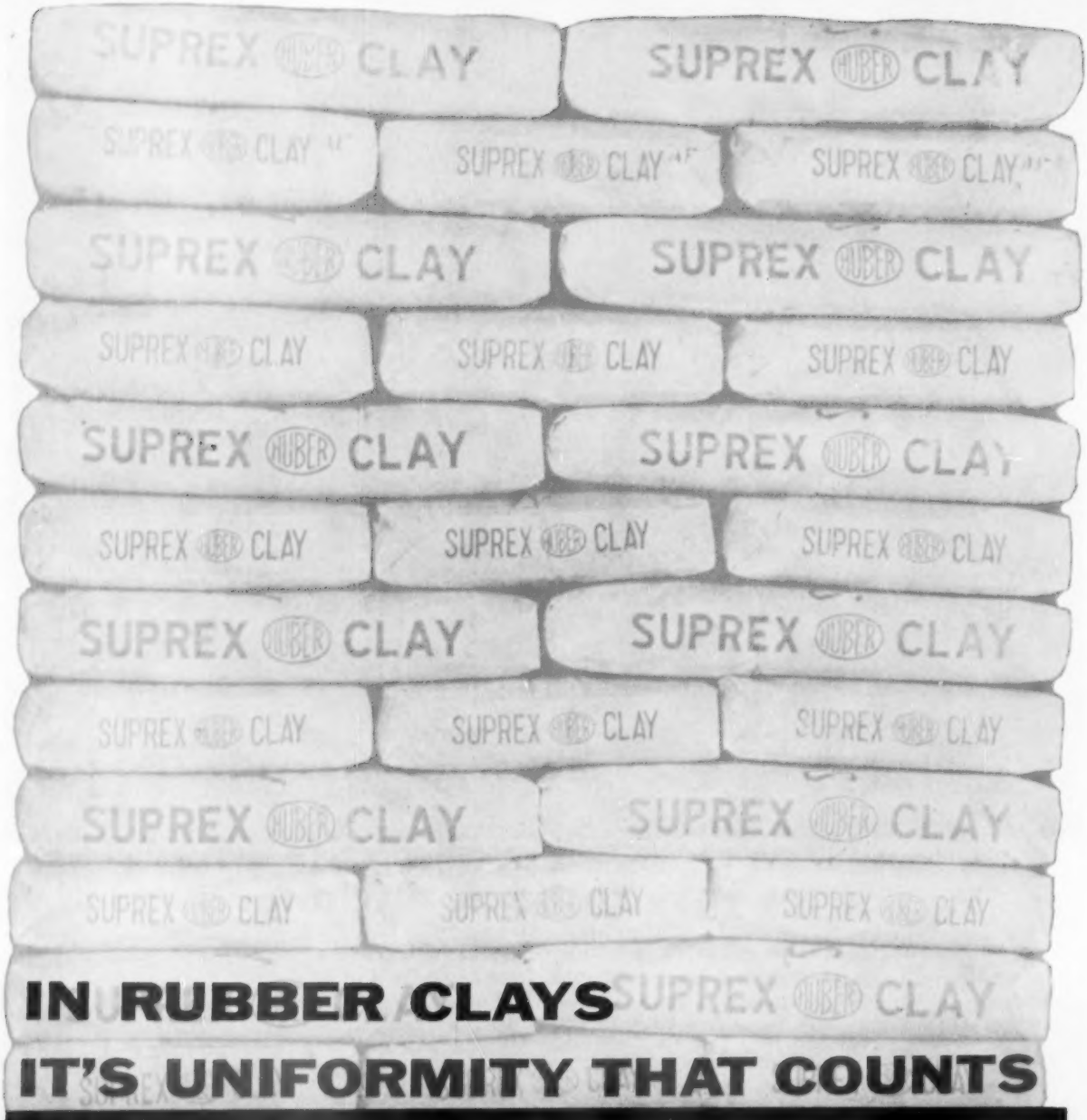


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COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

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**How Engineered Cooling Paid Off for the Western Backing and Coating Co.—*By Burt Wetherbee*** ..... 834

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# Letters to the editor

## Review and Preview

Dear Sir:

. . . The condensation of industry views, as you have presented in this review, is time-saving and should appeal to your readers.

JOHN L. COLLYER
B. F. Goodrich Co.
Akron, Ohio

. . . It will be helpful to have this, since I am sure that the material will be used frequently in our own market analysis work.

J. A. TALLANT
Rubber Chemicals Division
Phillips Chemical Co.
Bartlesville, Okla.

. . . an exceptionally fine piece of work, comprehensive, factual and well presented. The supporting charts are especially good and provide the quick glance reader an opportunity for getting past records and forecasts in a hurry.

H. C. BUGBEE
Natural Rubber Bureau
Washington, D. C.

. . . This summary . . . seems to me very worthwhile . . . a good deal of information is made available to readers.

E. G. HOLT
Business and Defense Services Administration
Department of Commerce
Washington, D. C.

. . . is a very worthwhile contribution . . . and it will be helpful in long-range planning.

J. S. CORRIGALL
R. T. Vanderbilt Co.
New York, N. Y.

. . . article was interesting, informative, and very well done.

A. W. BALLENTINE
E. I. du Pont de Nemours & Co.
Wilmington, Del.

. . . The facts and figures are of value in our market work.

J. E. MILLER
Goodrich-Gulf Chemicals, Inc.
Cleveland, Ohio

*Memo from the Editor*

**The "Letters to the Editor" columns are open to all of our readers and we invite comments for publication. Address: Editor, RUBBER AGE, 101 West 31st St., New York 1, N. Y.**

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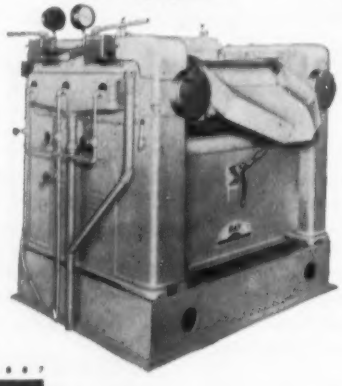

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## Coming Events . . .

**Feb. 22.** Quebec Rubber & Plastics Group, Ladies' Night.

**Mar. 5.** Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

**Mar. 12.** Ontario Rubber Group, C.I.C., Kitchener, Ont.

**Mar. 15.** Chicago Rubber Group, Furniture Mart, Chicago, Ill.

**Mar. 18-21.** Society of the Plastics Industry, Annual National Conference, Los Angeles-Biltmore Hotel, Los Angeles, Calif.

**Mar. 22.** New York Rubber Group, Henry Hudson Hotel, New York, N. Y.

**Apr. 2.** Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

**Apr. 5.** Akron Rubber Group, Spring Meeting, Sheraton-Mayflower Hotel, Akron, Ohio.

**Apr. 9.** Ontario Rubber Group, C.I.C., Toronto, Ont.

**Apr. 11.** Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

**Apr. 12.** Detroit Rubber & Plastics Group, Detroit-Leland Hotel, Detroit, Mich.

**Apr. 18.** Quebec Rubber & Plastics Group.

**Apr. 26.** Chicago Rubber Group, Furniture Mart, Chicago, Ill.

**May 7.** Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

**May 10.** Ontario Rubber Group, C.I.C., Niagara Falls, Ont.

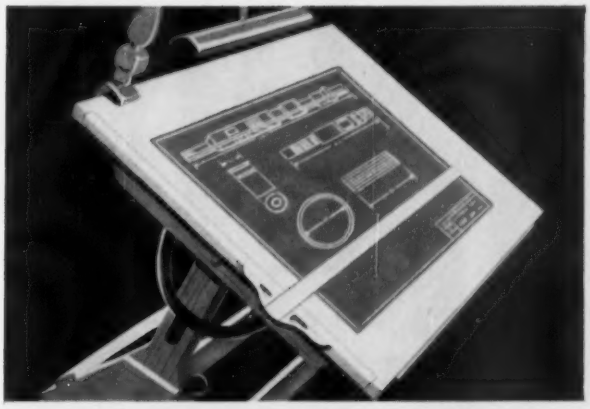
**May 15-17.** Division of Rubber Chemistry, A.C.S., Joint Meeting with Rubber Chemistry Division of C.I.C., Sheraton-Mount Royal Hotel, Montreal, Que., Canada.

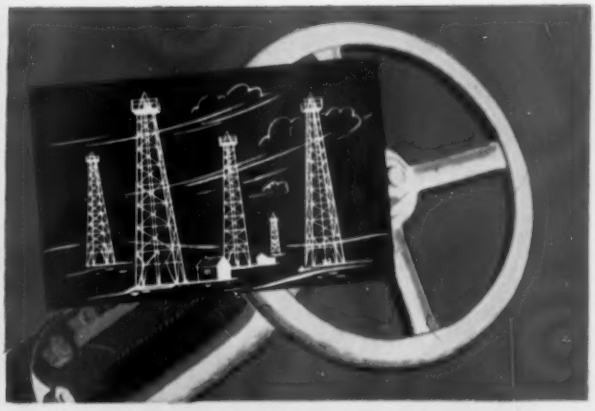
**May 24.** Connecticut Rubber Group.

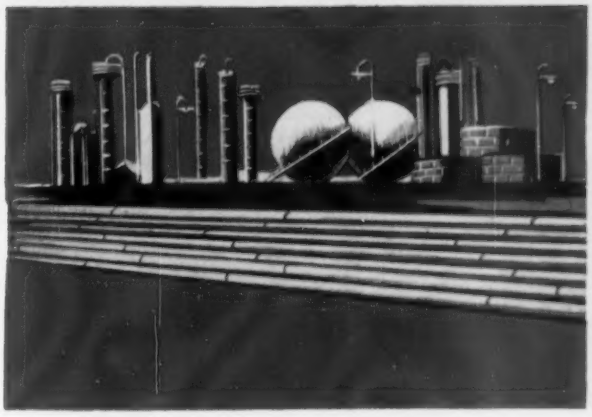
**June 7-9.** Los Angeles Rubber Group, Summer Outing, Sahara Hotel, Las Vegas, Nevada.

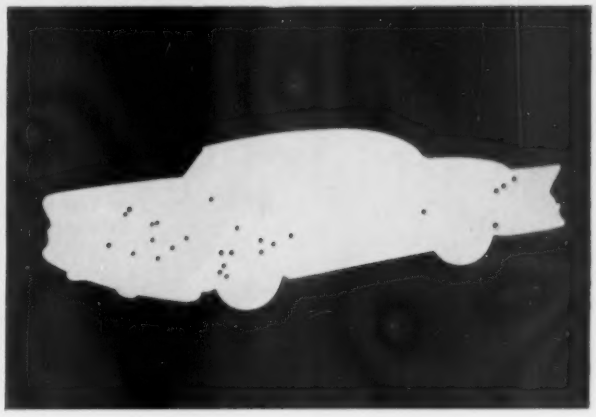
**June 7.** Fort Wayne Rubber & Plastics Group, Summer Outing, Lake Tippecanoe, Leesburg, Ind.

# Naugatuck Paracrils









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## Coming Events (cont'd) . . .

**June 7.** Quebec Rubber & Plastics Group, Golf Tournament.

**June 9-13.** A.S.M.E. Semi-Annual Meeting, Sheraton-Palace San Francisco, Calif.

**June 21.** Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

**June 28.** Detroit Rubber & Plastics Group, Western Country Club, Detroit, Mich.

**Sept. 7.** Connecticut Rubber Group.

**Sept. 11-13.** Division of Rubber Chemistry, A.C.S., Fall Meeting, Hotel Commodore, New York, N. Y.

**Sept. 23-25.** A.S.M.E., Fall Meeting, Hotel Statler, Hartford, Conn.

**Sept. 26.** Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

**Oct. 1.** Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

**Oct. 4.** Detroit Rubber & Plastics Group, Detroit-Leland Hotel, Detroit, Mich.

**Oct. 4.** New York Rubber Group, Henry Hudson Hotel, New York, N. Y.

**Oct. 25.** Akron Rubber Group, Fall Meeting, Sheraton-Mayflower Hotel, Akron, Ohio.

**Nov. 5.** Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

**Nov. 15.** Connecticut Rubber Group.

**Dec. 1-6.** A.S.M.E. Annual Meeting, Hotel Statler, New York, N. Y.

**Dec. 5.** Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

**Dec. 6.** Detroit Rubber & Plastics Group, Xmas Party, Sheraton-Cadillac Hotel, Detroit, Mich.

**Dec. 13.** New York Rubber Group, Henry Hudson Hotel, New York, N. Y.

**May 14-16, 1958.** Division of Rubber Chemistry, A.C.S., Spring Meeting, Netherlands Plaza Hotel, Cincinnati, Ohio.

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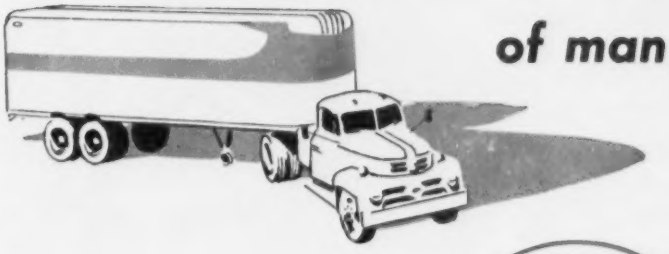

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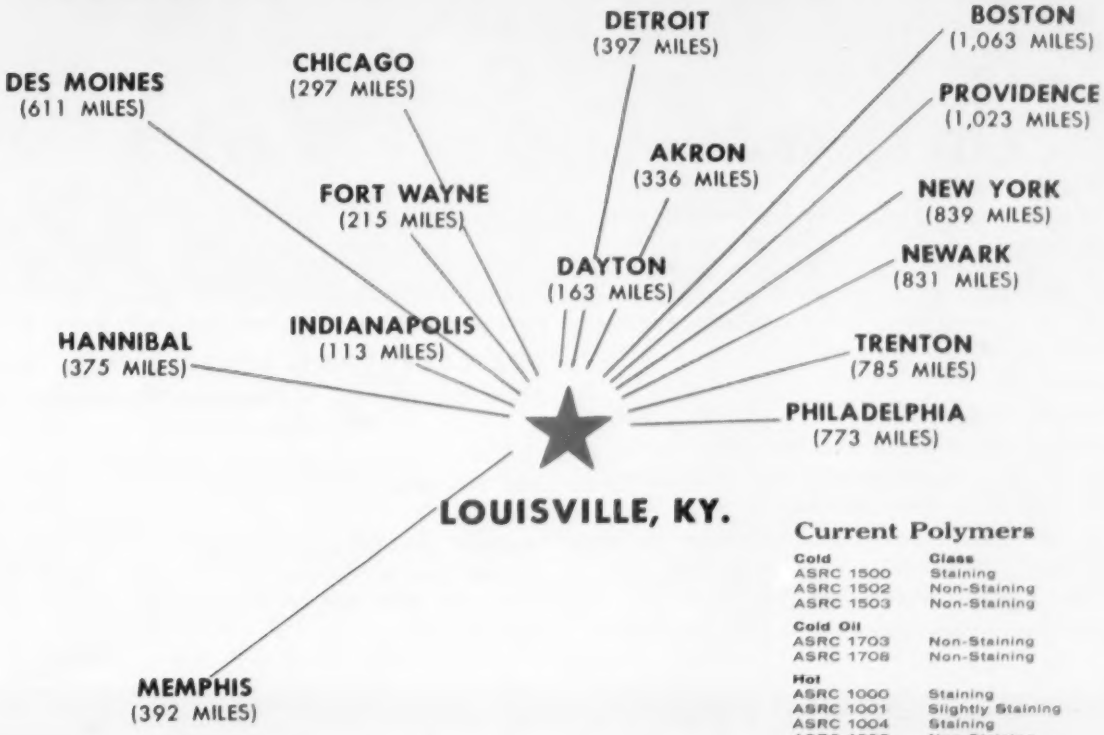
# located at the "Hub" of the rubber market

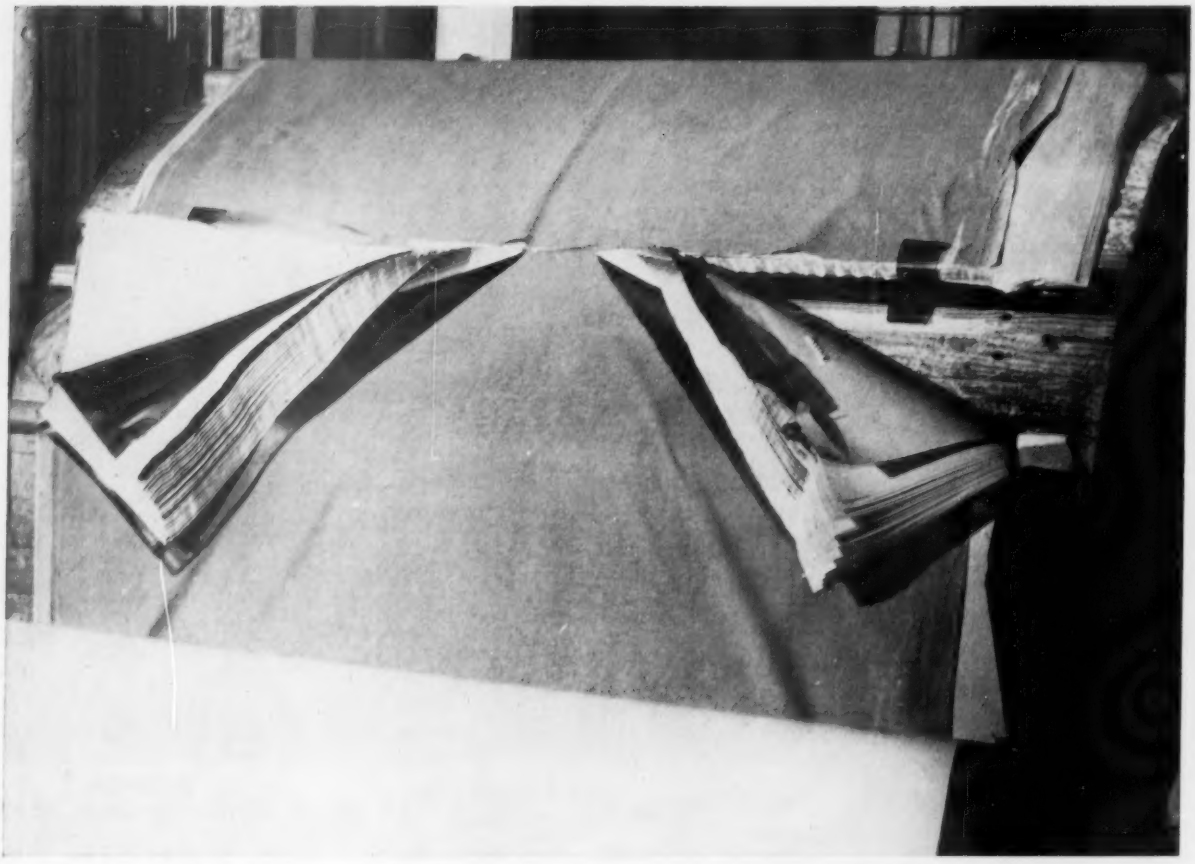



**Current Polymers**

| | |
|---|---|
| **Cold** | **Class** |
| ASRC 1500 | Staining |
| ASRC 1502 | Non-Staining |
| ASRC 1503 | Non-Staining |
| **Cold Oil** | |
| ASRC 1703 | Non-Staining |
| ASRC 1708 | Non-Staining |
| **Hot** | |
| ASRC 1000 | Staining |
| ASRC 1001 | Slightly Staining |
| ASRC 1004 | Staining |
| ASRC 1006 | Non-Staining |
| ASRC 1018 | Non-Staining |
| ASRC 1019 | Non-Staining |

## AMERICAN SYNTHETIC RUBBER CORPORATION

Plant and General Offices: Louisville, Kentucky • Executive and Sales Offices: 500 5th Ave., New York 36, N. Y.
Mid-West Sales Office: 22 Riverbend Pkwy., Fremont, Ohio
Cable: AMSYNRUB NEWYORK



# LINERETTE PLIES UP PROFITS

Linerette separating paper plied up with frictioned stock before being cut in the clicking operation, saves time and money. Since 1925 Linerette, the specially processed separating paper, has been used with steadily increasing acceptance. It assures clean, fast separation without adhesion and contains no oil or wax. Here is how Linerette can help you:

- Preserves tack.
- Protects lightweight stock in shipment—no fabric needed.
- Keeps stock free of cloth marks or impressions.
- Clippings may be mixed with scrap and worked away when used in die-cutting operations.
- Where cleanliness is essential, Linerette is a low cost lining for trays and containers.
- Stocks can be calender-fed into it.
- Used with most types of lightweight stocks in sheets or strips.

Linerette is available in any width up to and including 54", in rolls of 9", 11½", 13" and 15" diameters, on cores of 3" i.d. The yield is approximately six square yards to the pound. A 9" roll contains 375 linear yards and a 15" diameter about 1150 linear yards. Ask for a sample today, just specify desired width.

**THE CLEVELAND LINER & MFG. CO.**
**5508 Maurice Ave. • Cleveland 27, Ohio, U. S. A.**
*Cable Address: "BLUELINER"*

**GET THE FULL STORY ON CLIMCO PROCESSING**

Illustrated booklet tells about Climco Liners and Linerette separating paper. Tells how to get better service from liners. Write for your copy now.

CLIMCO

# LINERETTE

## INTERLEAVING PAPER

MADE BY THE MANUFACTURERS OF CLIMCO PROCESSED LINERS

IN
CARBON BLACKS
IT'S
**WITCO-CONTINENTAL**
FOR

# Q.T.Q.R.

**T**ype: No need for "sales talk" here! Witco-Continental has every type of channel and furnace black for natural and synthetic rubber. They're listed below.

**Q**uality: The proof is in the reports of our customers' laboratories, and we know our blacks, made specifically for your purposes, are tops in their field.

**R**esearch: Add up the Witco Research and Technical Service Laboratory at Akron, the Research Laboratory at Amarillo, and the convenience of our local offices. Multiply by 37 years of sales experience. The result is a "Service Factor" that reduces *your* purchasing problems to merely specifying amounts and delivery dates.

**Witco-Continental CARBON BLACKS**

**Furnace Blacks**

Continex® SRF – Semi-Reinforcing
Continex SRF-NS – Non-Staining
Continex HMF – High Modulus
Continex HAF – High Abrasion
Continex FEF – Fast Extruding
Continex ISAF – Intermediate Super Abrasion
Continex CF – Conductive Furnace

**Channel Blacks**

Continental® AA – (EPC) – Witco No. 12
Continental A – (MPC) – Witco No. 1
Continental F – (HPC) – Witco No. 6
Continental R-40 – (CC) – Conducting

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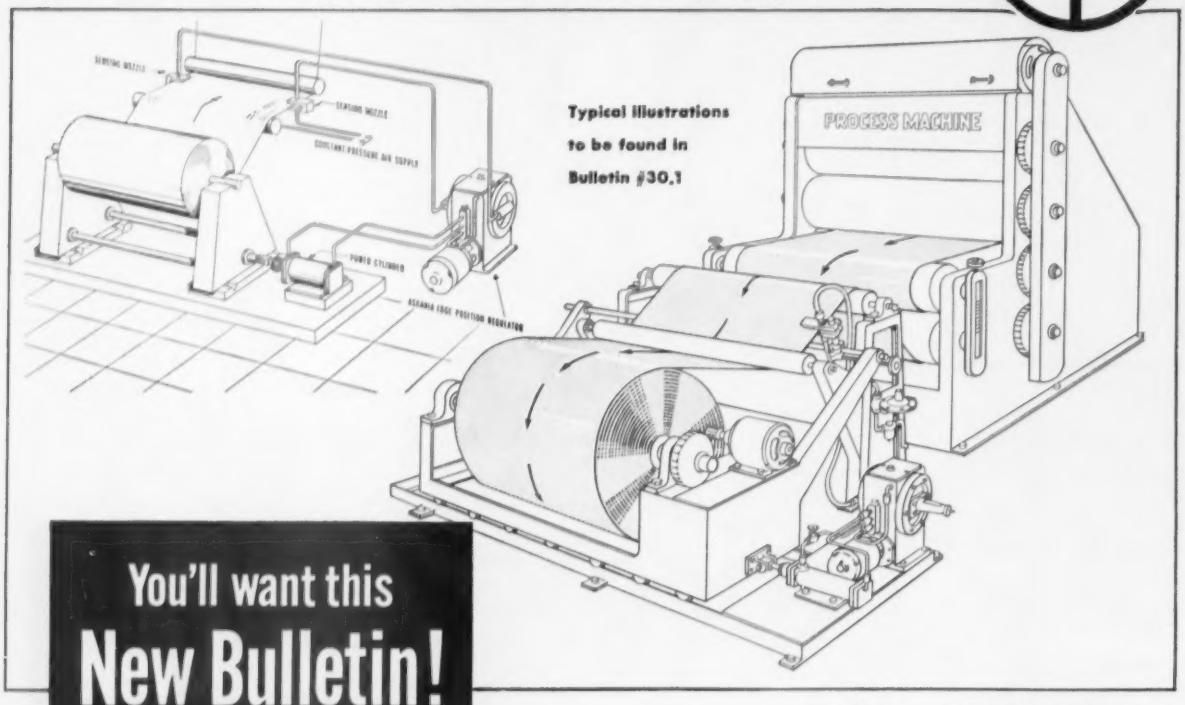
London and Manchester, England

# Askania Regulator Company NEWS

**Automatic Edge Position Control for Calenders, Slitters, Winders, Rewinders • Adaptable to new or existing equipment**




**Typical illustrations to be found in Bulletin #30.1**

## You'll want this New Bulletin!

### Tells How Calendering, Tire Lining, Rewinding And Slitting Operations Can Be Improved And Costs Lowered

ASKANIA REGULATOR APPLICATION BULLETIN #30.1 tells how economical operations, higher quality products, savings in scrap and labor can be obtained by using the ASKANIA EDGE GUIDE CONTROL.

**1** This bulletin shows that Askania Edge Position Controls can be applied to maintain the desired lateral position of any moving web ranging from light fabric cord to heavy, 2" rubber matting.

**2** It explains the simplicity of installing these controls to new or existing equipment.

**3** It tells how Askania Edge Position Controls practically eliminate trimming and minimize wastes.

**4** This Bulletin explains the extreme accuracy which results—how better tire lining output per dollar spent is effected.

**5** It elaborates on the importance of—
Non-contact, non-clogging Position Sensing of the rubber edge
Simple application and installation features
Handling *any* web of rubber at *any* speed
Powerful corrective action
Dependability—low maintenance.

**6** And it carefully describes the *exact* function of the Askania Edge Position Control —shows how and why it works as it does.

**Practical Information**

This bulletin was written to help translate the meaning of ASKANIA EDGE POSITION CONTROL in terms of *your own specific problems.*

**Look at a partial list of illustrations:**

**1** Typical Edge Guide Installation on a Calender Machine

**2** Guiding Raw Rubber Stock on a Conveyor Belt

**3** Askania Rubber Edge Control on a Tire Liner, Rewinding Operation

IF YOU'RE LOOKING FOR A CONTROL SYSTEM which is easy to apply, efficient, accurate, versatile and dependable—

**If you're interested in knowing—**

HOW edge position control can be applied to your own practical advantage

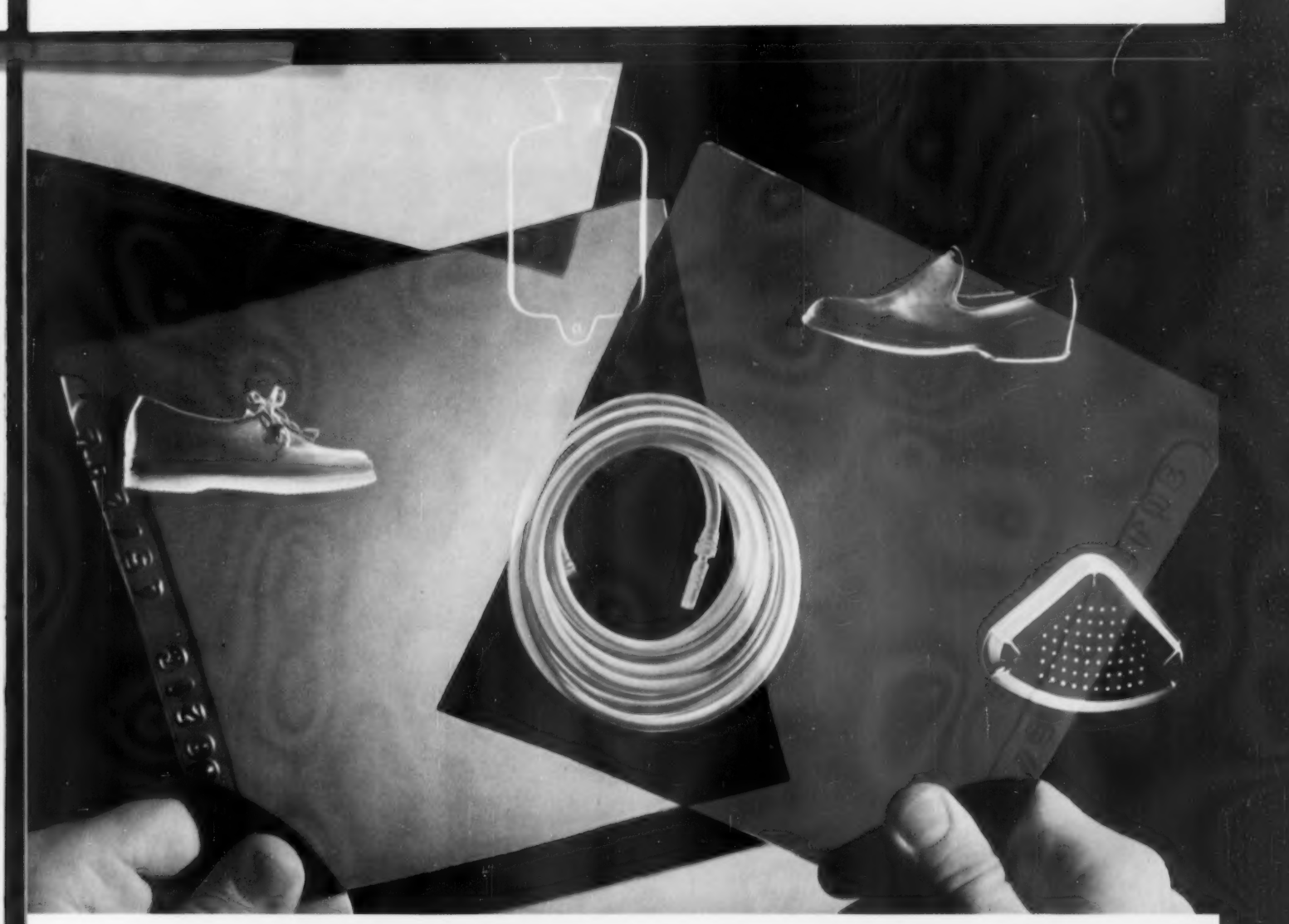
WHERE Askania Automatic Edge Position Controls can apply to your processes

WHY Askania Automatic Controls will be most efficient and get the best results for you

Write today for your copy of ASKANIA REGULATOR APPLICATION BULLETIN #30.1 to Askania Regulator Company, 286 E. Ontario, Chicago 11, Ill.

**ASKANIA REGULATOR COMPANY**
**"CONTROLS FOR INDUSTRY"**
HYDRAULIC, ELECTRONIC CONTROLS & SERVOS, GENERAL SYSTEMS, ENGINEERING & COMPUTER SERVICE, VALVE ACTUATORS & CYLINDERS

A SUBSIDIARY OF CPE



# What new use for synthetic rubber do you see here?

**Clearly different** is the sample of compounded PLIOFLEX—the lighter colored synthetic rubber—pictured above. It's the first time ever that such clarity has been achieved in rubber. And what a host of possible uses it brings to mind—shoe soles, hose, tubing, toys, housewares, novelties.

**Easier said than done,** however, was finding the right combination of materials to produce this "clear" compound. Over 700 formulations were evaluated before success was realized. And of all the rubbers and pigments tested only combinations of PLIOFLEX 1778 and a silica pigment, Hi-Sil 233, permitted the maximum clarity for both hard and soft products.

**The reasons why** PLIOFLEX fills the bill so well are its extremely light color, its purity and its excellent general physical properties, not to mention its economy. These, incidentally, are the same reasons why PLIOFLEX is so frequently specified for other, more common uses.

**What can you do** with PLIOFLEX in "clear" rubber or other applications? Start finding out by writing for full details to: Goodyear, Chemical Division, Dept. B-9419, Akron 16, Ohio.

CHEMICAL
GOODYEAR
DIVISION

RUBBER &
RUBBER CHEMICALS
DEPARTMENT

Chemigum, Plioflex, Pliolite, Plio-Tuf, Pliovic – T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

CHEMIGUM • PLIOFLEX • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS

Hi-Sil—T.M. Columbia-Southern Chemical Corporation

High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

**A FRESH TACK TO A TACKY PROBLEM**—Cooper Tire & Rubber Company were anxious to develop an alternate liner fabric for the one they had been using. One possibility suggested was a new blend of cotton and rayon recently developed by Mount Vernon Mills. Cooper Company gladly agreed to give it a try. Results have been beyond anyone's expectations! Despite its slightly *lower* original cost, this new fabric has worked equally as well as any fabric previously used—and lasted much longer besides.

This is another example of how fabrics made by Mount Vernon Mills, Inc. and the industries they serve, are serving America. Mount Vernon engineers and its laboratory facilities are available to help you in the development of any new fabric or in the application of those already available.

*UNIFORMITY Makes The Big Difference In Industrial Fabrics*

*Mount Vernon Mills, Inc.*

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TURNER HALSEY COMPANY *Selling Agents*

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# is a nasty word to rubber!

Ozone cracking in rubber is expensive, in sales lost and user dissatisfaction. Protect your rubber products from this danger with Universal's high potency antiozonants, UOP 88 and UOP 288.

Developed by Universal, these antiozonants have proven that they can provide complete protection to tires, or other rubber products under both dynamic and static exposure.

We'll be glad to recommend the best UOP 88 or 288 formulation to protect your product from ozone cracking and help it maintain the appearance and the service built into it.

**UOP 88® and 288**
TRADEMARK
**RUBBER ANTIOZONANTS**

UOP®

PRODUCTS DEPARTMENT

**UNIVERSAL OIL PRODUCTS COMPANY**

30 ALGONQUIN ROAD
DES PLAINES, ILLINOIS, U. S. A.

# Goodrich-Gulf Chemicals, Inc.

| Ameripol Code | REMARKS | APPLICATIONS |
|---|---|---|
| **HOT POLYMERS** | | |
| 1000 | General purpose hot rubber adaptable to most black products or products where color is unimportant. | Tires, molded and extruded mechanical goods, and many general purpose applications. |
| 1001 | More resistant to staining and discoloring than 1002. | Tires, molded and extruded mechanical goods, shoe soles and heels. |
| 1002 | Higher tensile and lower modulus in cured compounds than 1000 or 1001. Tends to slower curing, thus some adjustment might be necessary. | Tires, molded and extruded mechanical goods. |
| 1006 | Improved non-discoloring and non-staining polymer. | Light colored and white products such as white side-wall tires, shoe soles, floor tile, toys, etc. |
| 1007 | A glue-acid coagulated staining polymer with relatively low water absorption, low ash, and improved electrical properties. | Wire and cable insulation, electrical matting, gaskets, hard rubber products, etc. |
| 1009 | Non-staining cross-linked polymer. Use of small quantities with other type polymers effectively reduces shrinkage and die-swell in calender and extrusion operations. | Wherever control of shrinkage is important—footwear, wire and cable insulation, calendered sheet goods, camelback, soles and heels. |
| **COLD NON-OIL POLYMERS** | | |
| 1500 | General purpose cold rubber where color and staining is unimportant. | Tires, camelback, molded and extruded mechanical goods. |
| 1501 | Same as 1500 except slightly staining stabilizer which permits use in some darker colored products. | Tires, molded mechanical goods. |
| 1502 | Relatively non-discoloring and non-staining cold rubber. | Light colored and white products such as white sidewall tires, white and light colored mechanical goods, floor tile, hospital sheeting, toys, shoe soles and heels. |
| **COLD OIL-EXTENDED POLYMERS** | | |
| 1703 | General purpose relatively non-discoloring, non-staining polymer containing 25 parts oil. Presence of naphthenic oil may affect stain characteristics. | Light colored and white products—tires, mechanical goods, floor tile, hospital sheeting, toys, shoe soles and heels. |
| 1705 | General purpose polymer containing 25 parts aromatic oil for use where staining, discoloring is unimportant. | Tires, camelback, molded and extruded mechanical goods. |
| 1707 | Similar to 1703 but for 37.5 parts naphthenic oil, and emulsified with rosin soap rather than mixed soaps. | Tires, camelback, shoe soles and heels, molded and extruded mechanical goods. |
| 1708 | Relatively non-discoloring, non-staining polymer containing 37.5 parts naphthenic oil. Glue acid coagulation provides lower water absorption and improved electrical properties. | Wire and cable insulation, athletic goods, coated fabrics, molded and extruded mechanical goods. |
| 1710 | Similar to 1705 except for 37.5 parts of an aromatic oil. | Tires, camelback, molded and extruded goods. |
| 1712 | General purpose oil extended for use where color is unimportant. 37.5 parts high aromatic oil. | Tires, camelback, molded and extruded mechanical goods, wire and cable insulation. |

## selection guide to *Ameripol* man-made rubber

Ameripol man-made rubber is a preferred material for conveyor and drive belts, rolls, extrusions, molded goods, and many other industrial products. Ameripol is superior to natural rubber in resistance to wear, water, and chemicals. Superior aging properties can be provided by compounding techniques.

A 24-page booklet "Ameripol—the preferred rubber" lists technical data, specifications, and physical properties. To get the facts on this preferred material write for your free copy today.

*Ameripol* RUBBER

Cold Non-Oil Polymers
•
Cold Oil-Extended Polymers
•
Hot Non-Oil Polymers

**Goodrich-Gulf Chemicals, Inc.**
3121 Euclid Avenue • Cleveland 15, Ohio

Versatile White for Rubber

# 'HORSE HEAD' TITANIUM DIOXIDE

## A-420

(anatase)

Try A-420 in any of your white or light-colored rubber products and you will find it most versatile. A-420 provides excellent results in a wide range of uses—from colorful drug sundries to white sidewalls that stay white.

**A-420 provides excellent whitening power**

**A-420 incorporates and disperses easily in any elastomer**

**A-420 disperses readily in latex and, because of low salts content, does not interfere with stability**

**A-420 imparts excellent dynamic flex-crack resistance in white sidewalls**

**A-420 retains its brilliant whiteness under all types of service conditions**

Our sales representative in your area will be glad to discuss with you the use of A-420, and also specific applications where you can use to advantage some of the other Horse Head anatase and rutile grades.

**THE NEW JERSEY ZINC COMPANY**

*Founded 1848*

160 Front Street, New York 38, N. Y.

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*Also Distributed by*

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**ST. LAWRENCE CHEMICAL COMPANY, LTD.**

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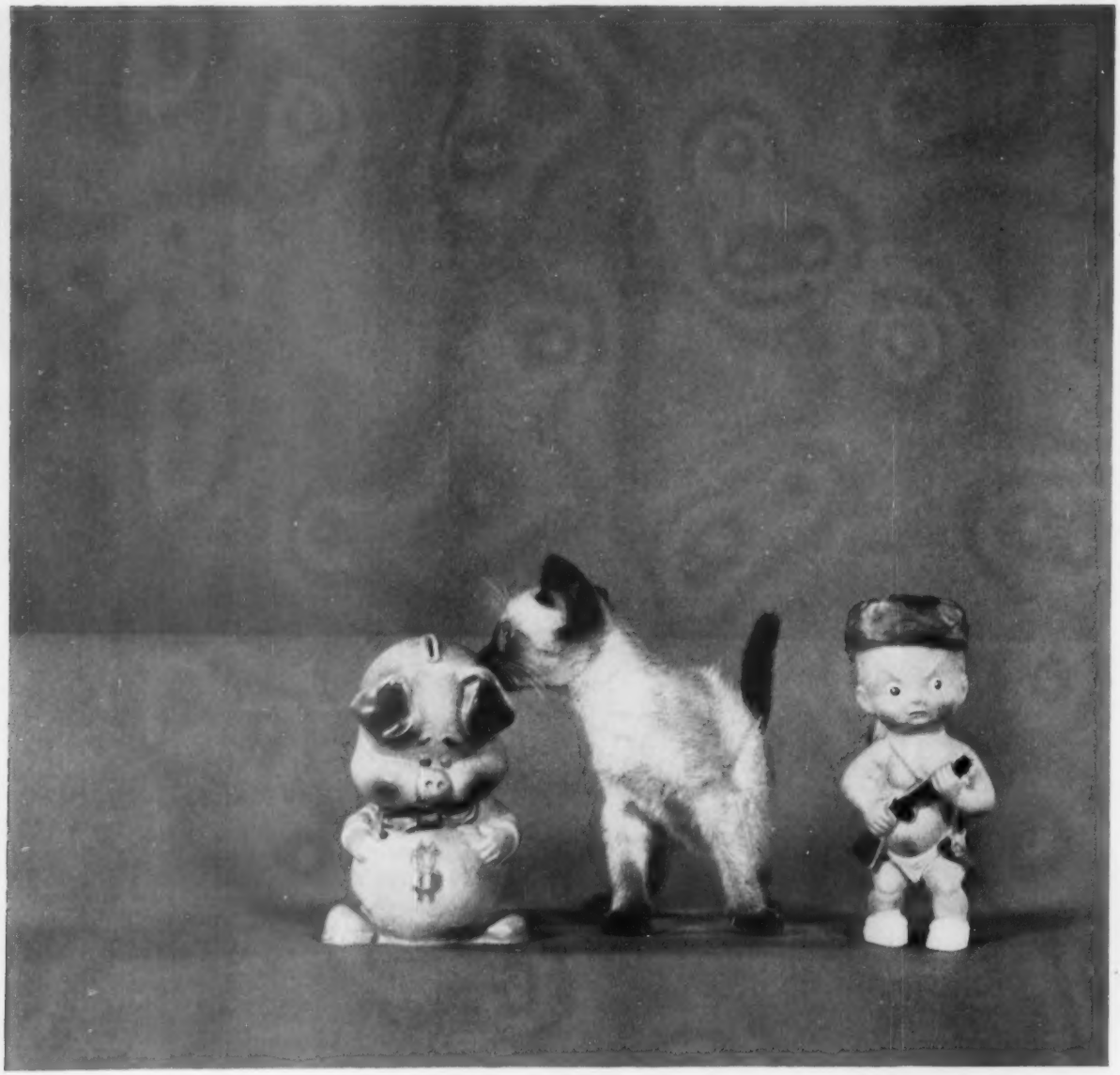
HORSE HEAD PRODUCTS



# quality worth investigating

**PLEASANT FEEL** balanced with all-important durability are gained when you use Argus low viscosity plasticizers. Drapex 3.2 gives the optimum degree of viscosity with considerably less plasticizer than is otherwise needed.

Toys must have clean and even coloring without a trace of copper mold stains that destroy sales appeal. The complete dispersion effected by the all-liquid Argus Stabilizer Combination Mark M–Mark PL means an even formulation with no unstabilized areas.

Quality formulations, economies in materials and processing, and attractive, saleable items are advantages you gain by specifying Argus stabilizers and plasticizers. *Argus has the answers* to your vinyl formulation problems—either in our line products or our research laboratory. Send for technical bulletins and samples.

**ARGUS CHEMICAL** CORPORATION / New York and Cleveland

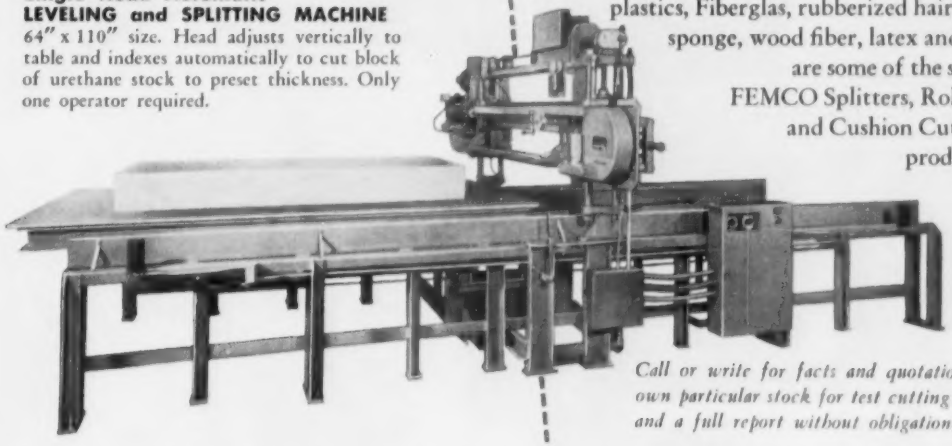
Main Office: 633 Court Street, Brooklyn 31, N. Y. Branch: Frederick Building, Cleveland 15, Ohio

Rep's.: H. M. Royal, Inc., 4814 Loma Vista Ave., Los Angeles; Philipp Bros. Chemicals, Inc., 10 High St., Boston; H. L. Blachford, Ltd., 977 Aqueduct St., Montreal

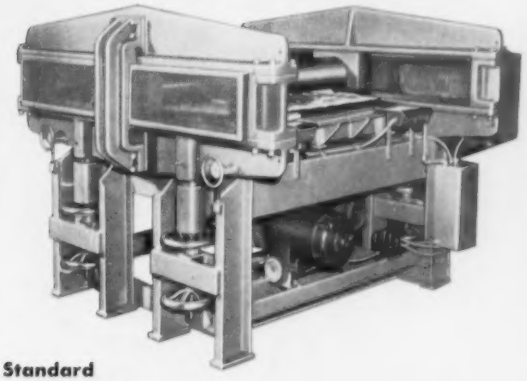
# CUT and SPLIT STOCKS with FEMCO SPECIAL MACHINES

You name the material and the chances are that FEMCO's special machines will die cut, trim, shape or split it. Polyvinyl chloride foams (pvc), polyurethane, plastics, Fiberglas, rubberized hair, cork, cellulose sponge, wood fiber, latex and bonded foams are some of the stocks on which FEMCO Splitters, Roller Die Cutters and Cushion Cutters are setting production records.

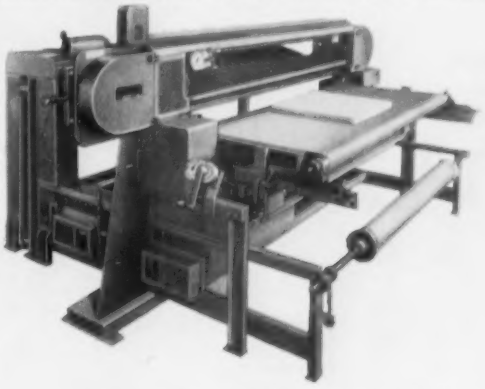
**Single Head Automatic LEVELING and SPLITTING MACHINE**
64" x 110" size. Head adjusts vertically to table and indexes automatically to cut block of urethane stock to preset thickness. Only one operator required.



*Call or write for facts and quotations. Send us your own particular stock for test cutting in our laboratory and a full report without obligation.*



**Standard and Heavy Duty ROLLER DIE CUTTER**
***(bed area to 28 sq. ft.)***
Makes multiple die cuts with inexpensive steel rule dies, fast and accurately. Trims molded rubber goods.



**New Model 75 FOAM RUBBER SPLITTER**
Splits 8" stock into 2 four-inch slabs, or other thickness as required. Has dual motor rise blade sharpener and special polyurethane guide bar. Splits urethane, foam, etc.

***These machines will die cut or split Synthetic and Natural Foam Rubber, Latex and Bonded Foam, Rubberized Hair, Cellulose Sponge, Cork, Resin Bonded Fiber, Wood Fiber, Fiberglass and Plastics in rolls, slabs and sheets.***

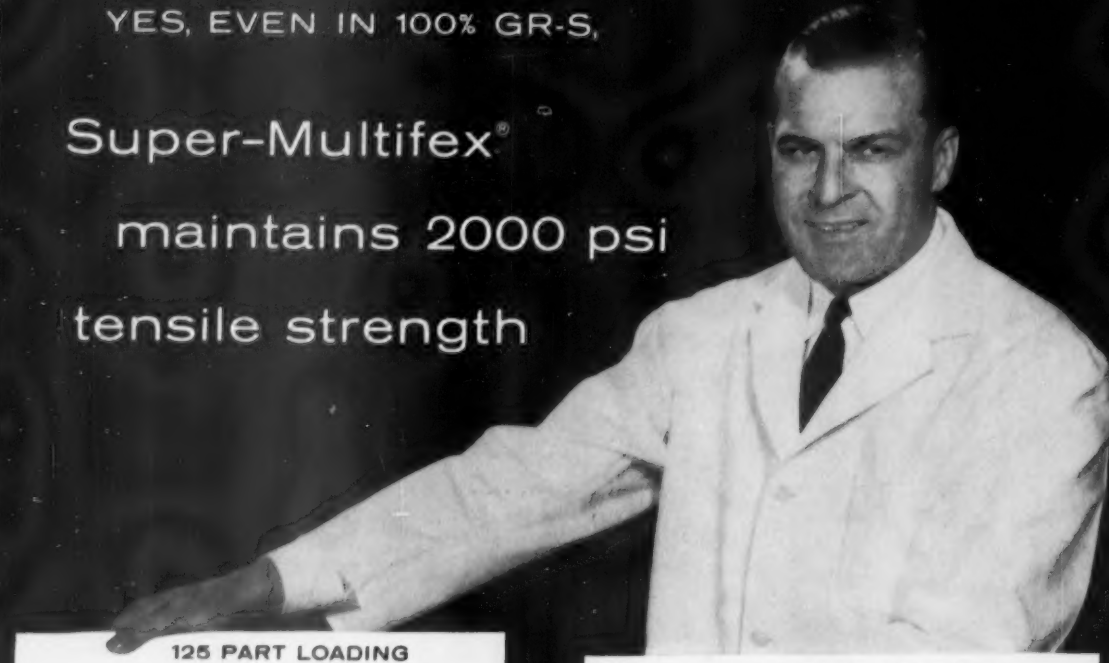
**FEMCO'S V-BELT EQUIPMENT**
includes Collapsible and Ring Molds, Curing Cages, Autoclave Type Belt Molders, Hydraulic and Manual Manipulators, Vertical and Horizontal Type Measuring and Matching Machines, Notching Machines, the new and improved V-Belt Skiving Machine, and a new and improved V-Belt Collapsible Building Drum. Call us first for this equipment.

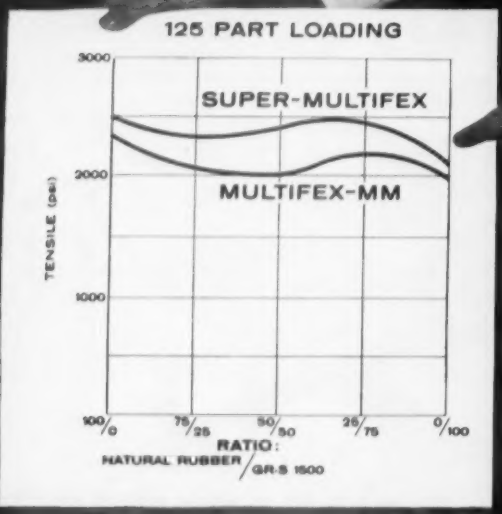
1917 40th ANNIVERSARY 1957

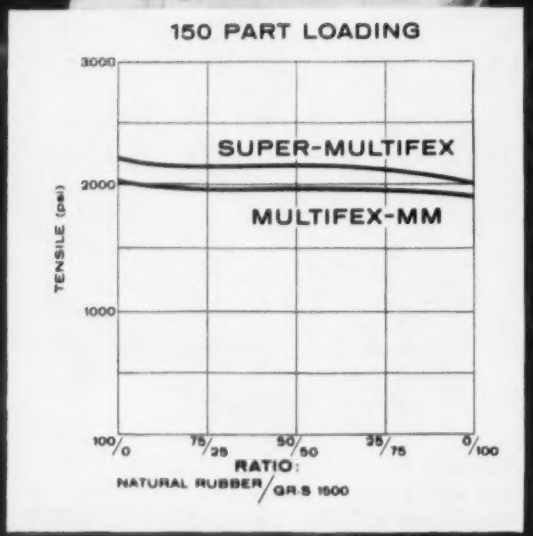
**The FALLS ENGINEERING AND MACHINE CO.**
Established 1917
1734 FRONT ST., CUYAHOGA FALLS, O.

YES, EVEN IN 100% GR-S,

# Super-Multifex® maintains 2000 psi tensile strength






Now you can use DIAMOND Super-Multifex in your GR-S compounds—even in those with *no* natural rubber—and be sure you're getting at least 2000 psi tensile strength.

Contrast the performance of Super-Multifex and Multifex-MM® with the much lower tensiles normally obtained in compounds containing ground limestone.

DIAMOND'S ultra-fine Super-Multifex (.03 micron) precipitated calcium carbonate has extremely uniform particles, coated to aid dispersion, mixing and processing.

Multifex-MM, also shown on the graphs, is an uncoated, ultra-fine (.04-.06 micron) precipitated calcium carbonate. You can see how it consistently reinforces GR-S, too.

Try either Super-Multifex or Multifex-MM in your next batch to improve physical properties. Call your DIAMOND Representative today. He can supply information and technical help on these and other high-grade calcium carbonates. Or write DIAMOND ALKALI COMPANY, 300 Union Commerce Bldg., Cleveland 14, Ohio.

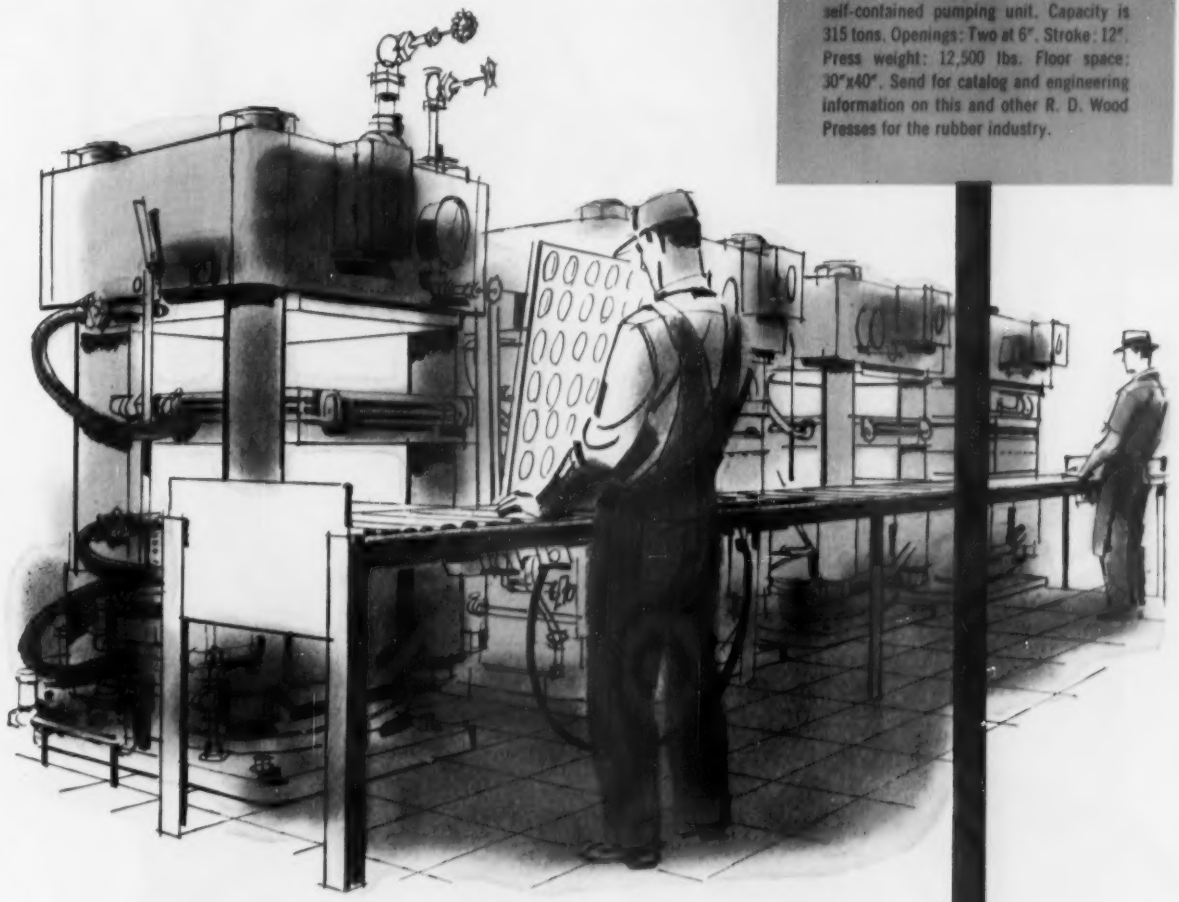
DIAMOND CHEMICALS

# *Engineered for Performance*

Put a Wood Press to work and get the money-saving advantages of smooth, dependable performance . . . long operation with low maintenance.

*Reason:* every Wood Press is the product of sound design, carefully selected materials, conscientious craftsmanship. This is why Wood Presses are known throughout industry for their trouble-free operation and fast, economical production. R. D. Wood has many standard press designs for such jobs as molding, curing, laminating, polishing and processing—and engineers others for special work. Write for our catalog and engineering information. No obligation, of course.

R. D. Wood High-accuracy 24"x24", 2-opening Press for molding rubber products. Can be furnished for operation from a central hydraulic system or with its own self-contained pumping unit. Capacity is 315 tons. Openings: Two at 6". Stroke: 12". Press weight: 12,500 lbs. Floor space: 30"x40". Send for catalog and engineering information on this and other R. D. Wood Presses for the rubber industry.



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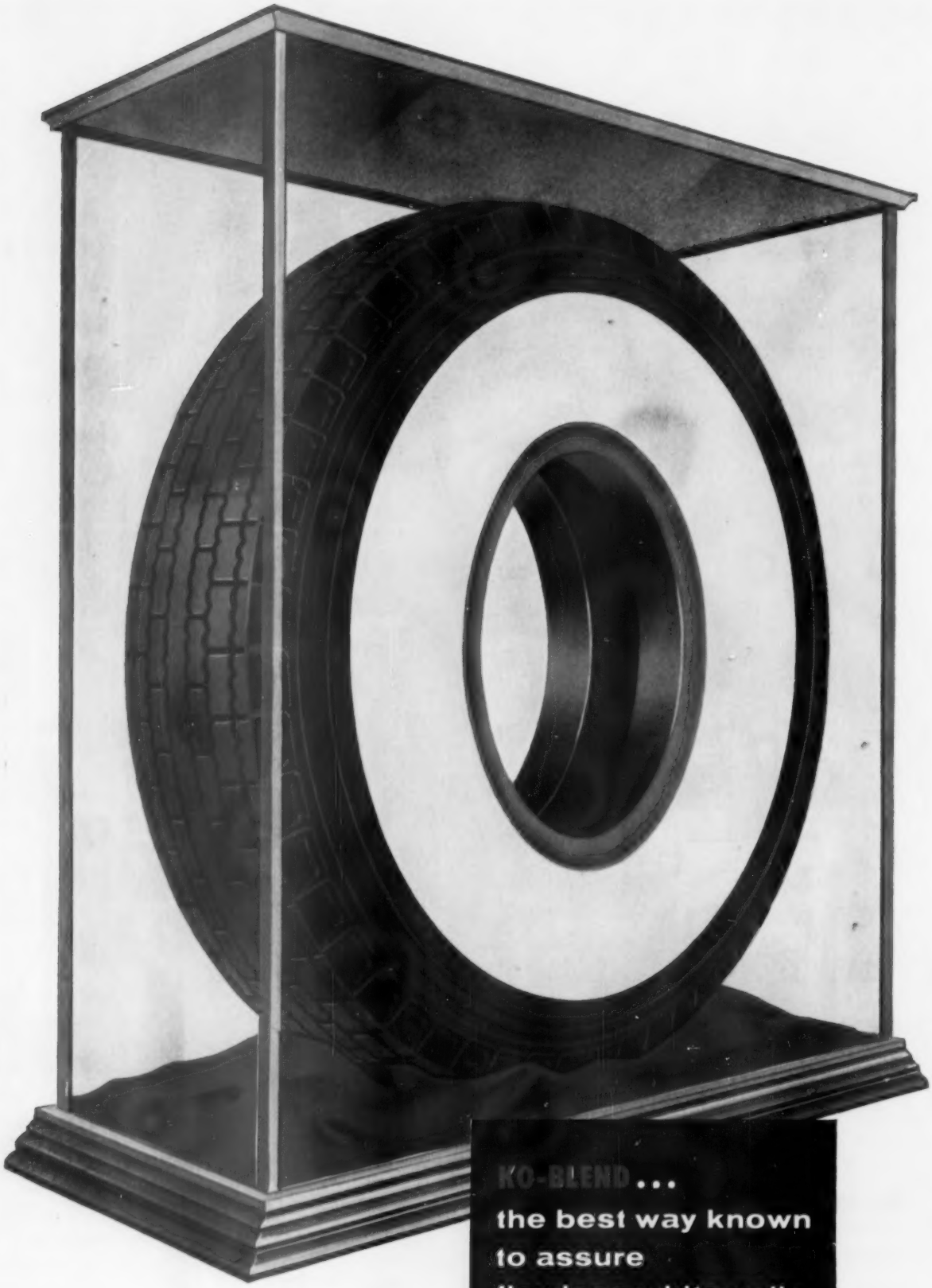
*Representatives in Principal Cities*

MAKERS OF HYDRAULIC PRESSES AND VALVES • FIRE HYDRANTS • CAST-IRON PIPE • GATE VALVES • GAS PRODUCERS • ACCUMULATORS


KO-BLEND . . .
the best way known
to assure
flawless whitewalls

## In white sidewall stock,

# KO-BLEND

## is your protection against

**SULFUR BLOOM**

**POOR SULFUR DISPERSION**

**MOLDING DEFECTS**

For less than ½¢ per whitewall tire you can add the small amount of Ko-Blend necessary to reduce rejects and reworks to a minimum. Ko-Blend is a latex-compounded masterbatch containing 85% insoluble sulfur which has been colloidally dispersed in GRS latex.

The extremely short milling time necessary to incorporate Ko-Blend makes it possible to maintain high Mooney viscosity in whitewall stocks while overcoming processing difficulties encountered when other types of sulfur are used. For samples and further information on how Ko-Blend eliminates spots, streaks and batch softening, write to:

THE GENERAL TIRE & RUBBER COMPANY
**Chemical Division**
AKRON, OHIO

*Creating Progress Through Chemistry*

## AN ANNOUNCEMENT OF IMPORTANCE
## TO ALL RUBBER AND PLASTICS MANUFACTURERS

# Sanitized®
FOR LASTING FRESHNESS

## IS NOW AVAILABLE FOR USE IN RUBBER AND PLASTICS PRODUCTS

BENDINER & SCHLESINGER
ANALYTICAL AND BACTERIOLOGICAL LABORATORY
THIRD AVENUE & TENTH STREET
NEW YORK 3, N.Y.
ESTABLISHED 1843

T-7352
U.S. Process Corp.,
369 Lexington Avenue,
New York 17, N. Y.

BACTERIOSTATIC TESTS:

| No. | Fabric side | RESULT |
|---|---|---|
| 1671-91-A | Plastic | Excellent. |
| | Ribbed. | Excellent. |
| 1671-91-B | Plastic. | Excellent. |
| | Ribbed. | Excellent. |
| 1671-91-C | Plastic. | Excellent. |
| | Ribbed. | Excellent. |

Samples. (1)
U.S. Rubber Co.
Experimental
DCP Vinyl
Test both sides.

BACTERIOSTATIC TESTS:
Plastic side. Excellent.
Ribbed side. Excellent.

For 25 years, Sanitized has been the approved bacteriostat for industrial use. The hygienic protection which Sanitized brings to America's freshness-loving millions has made it a unique and powerful sales stimulant for manufacturers and retailers. Now the marvelous advantages of the Sanitized process are available for rubber, liquid latex, foam rubber, and plastics products.

- non-toxic
- inhibits germ growth
- hygienically clean
- antiseptically clean
- retards odors
- resists mold and mildew
- assures lasting freshness
- laboratory approved

Sanitized chemists and engineers are ready to work with rubber and plastics processors and manufacturers on individual requirements. Sanitized is nationally advertised and featured by 40,000 retailers.
We invite your inquiries.

AGAR PLATE METHOD:
0.1 cc of 24 hour culture of standard strain of Micrococcus var. aureus (Staphylococcus aureus) and Standard F.D.A. agar; at 37° C. for 24 hours.

| Foam rubber | RESULT | HALO |
|---|---|---|
| | Excellent. | 6 mm. halo. |

BACTERIOSTATIC TESTS:

| | RESULT | HALO |
|---|---|---|
| White rubber sheet. | Excellent. | 5 to 6 mm. halo. |
| Rubber, yellow. | Excellent. | About 2 mm. halo. |

*For information write, call, or wire*
*RUBBER AND PLASTICS DIVISION*

**SANITIZED SALES COMPANY OF AMERICA, INC.**
*181 Madison Avenue, New York 16, New York · MUrray Hill 4-1253*

# Gives high whiteness—with minimum loading

## UNITANE® 0-220

### TITANIUM DIOXIDE

Save – through minimum loading – with UNITANE 0-220, yet get maximum whiteness in the bargain! The high opacity and clear color tone of this pigment give it maximum whitening power; you load less, get better results!

UNITANE 0-220 also eliminates some of the trouble spots in processing. It wets easily, is readily dispersible and is non-reactive with rubber chemicals. UNITANE 0-220 maintains its brilliancy throughout curing and aging, assuring a better-looking finished product with longer-lasting whiteness.

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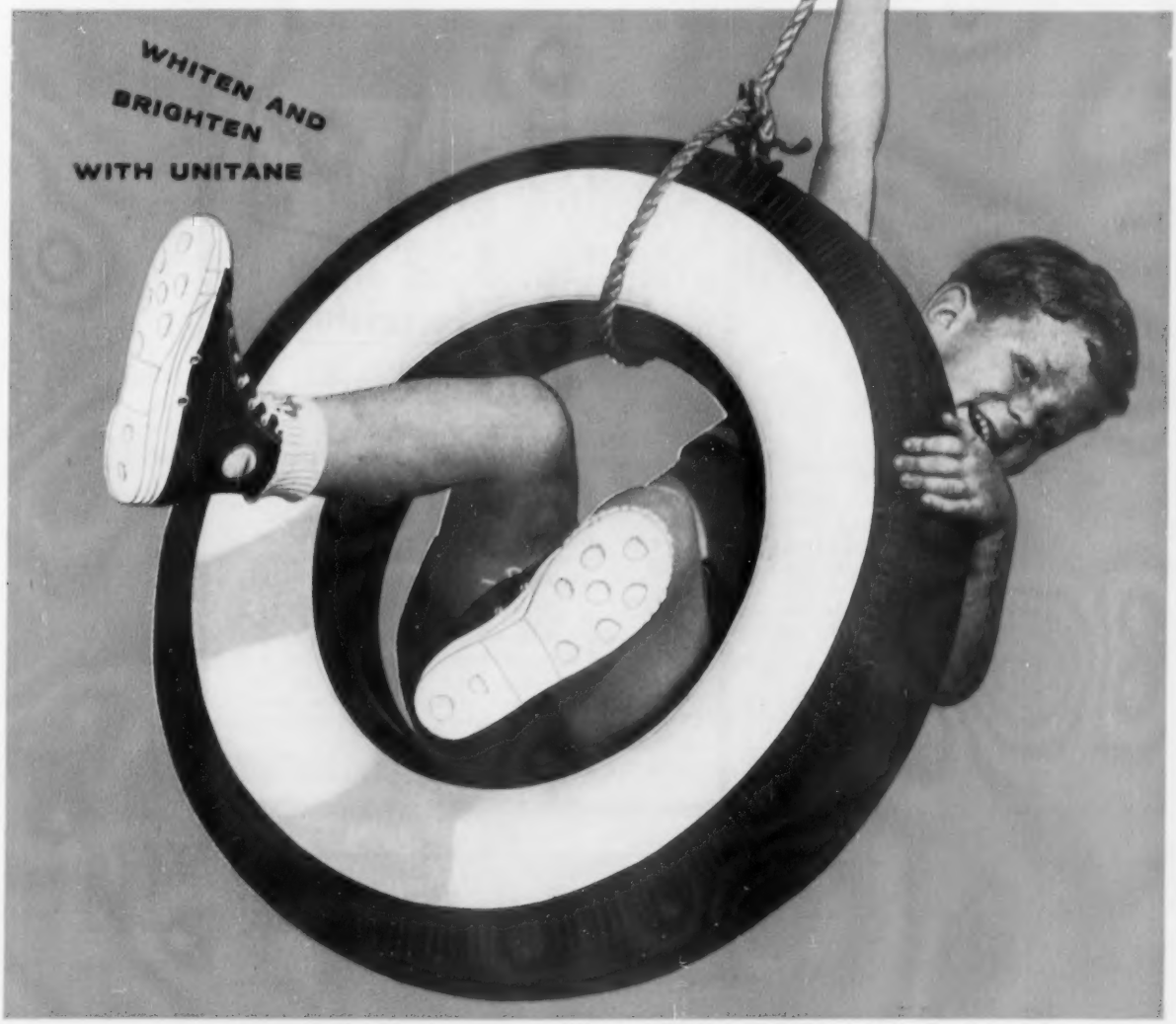

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# Where Successful Reclaims Start . . .

At Pequanoc Rubber Company, there is a very important door with a very special shingle. It reads, "Technical Service Department."

Behind this door, men of experience in producing special formulas in reclaimed rubber for over 55 years, have been helping Pequanoc's customers cut costs with quality reclaim.

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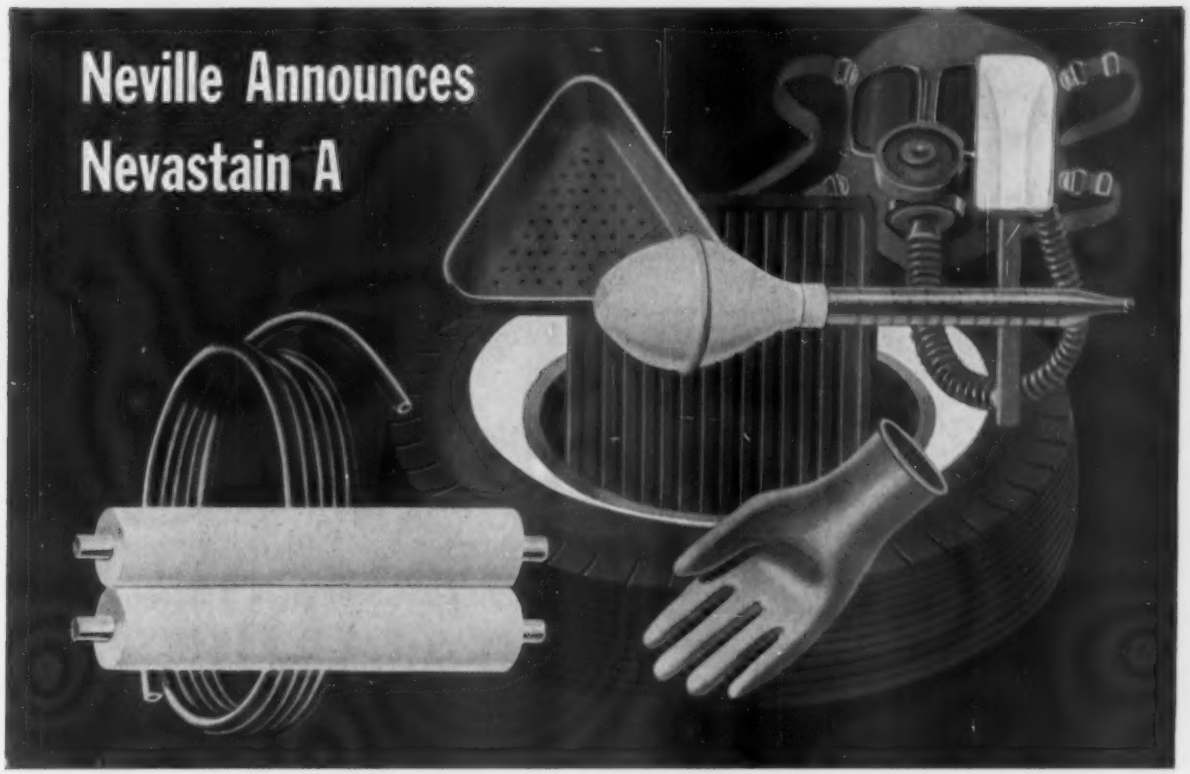


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Nevastain A is an excellent non-staining, non-discoloring antioxidant with very low volatility and good stability. Synthetic and natural rubber compounds using Nevastain A have superior physical characteristics over those containing competitive non-staining antioxidants. Among its virtues are that it does not retard vulcanization, does not have an accelerating effect and does not bloom uncured or cured stock when used in normal quantities. This new product is being produced on a plant scale and is readily available and attractively priced. Use the coupon below to write for Technical Service Report No. 45.

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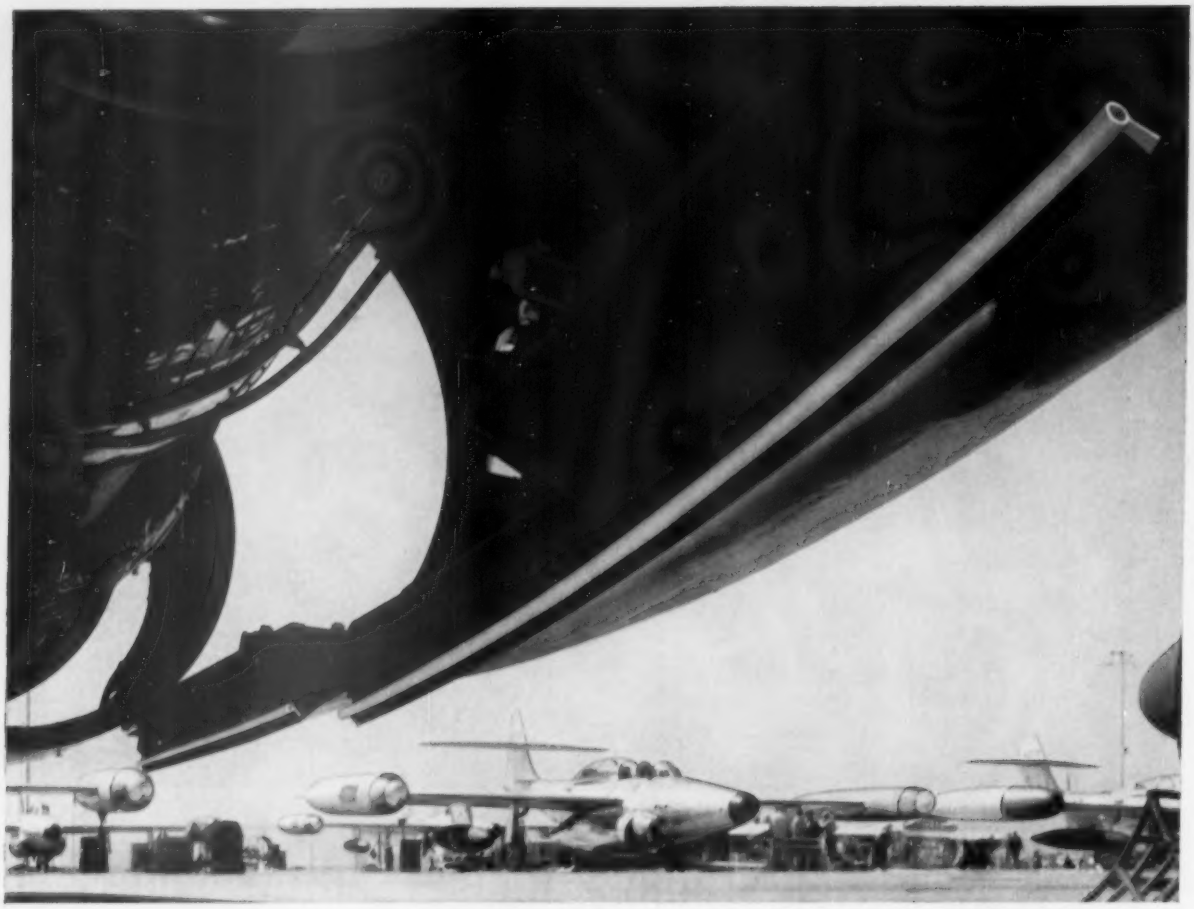

# SILASTIC 440 Gum

## Makes Seals Effective Down to —130 F

**TYPICAL PROPERTIES OF**
**LOW TEMPERATURE SEALS**
**MADE WITH SILASTIC 440 GUM**

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|---|---|
| Temperature range, °F | —130 to +500 |
| Tensile strength, psi | 900 |
| Elongation, % | 325 |
| Tear strength, ppi | 90 |
| Compression set, % | 30 |
| Hardness, Durometer | 50 |
| Extrusion | Good |

All properties obtained on ASTM slabs molded 5 minutes at 240 F. and cured 4 hours at 300 F.

Seals that stay soft and rubbery even at extremely low temperatures like those encountered by aircraft access doors are made from compounds containing Silastic* 440 silicone rubber gum. No toxic additives are needed to fabricate parts with low compression set. Easy to compound, Silastic 440 gum gives excellent resistance to weathering, ozone and moisture. Compounds made from Silastic 440 gum can be calendered, molded or extruded into high performance products.

*Do you want the recipe and complete compounding instructions for this low temperature stock using Silastic 440 gum? Contact the nearest Dow Corning branch office.*

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Here at Adamson we've been doing something that we believe is rather unique in the industry. Every now and then a manufacturer of rubber or plastics has expressed a desire to discuss certain problems pertaining to calendering or calendering equipment, and we have invited him and his associates to our conference room for a roundtable session with our staff. No one dreamed the idea up—it just grew. Some of the largest manufacturers in the industry have been our guests and have described the meetings as helpful and enlightening.

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**McNEIL**

# McNEIL

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automatic curing press

*automation in curing*

# FIRST with Shear Strip Tire Presses
# FIRST with Bladder Type Presses . . . and now . . .

# ..first with Completely Automatic Curing Presses

## THE NEW AUTOMATIC BAG-O-MATIC

Here it is — the world's first completely automatic tire curing press: The McNEIL-AKRON Model 230-40-11-½P Twin Tilt-Back Bag-O-Matic.

It brings all of the advantages of automation to tire curing — BETTER QUALITY because all cycles and operations are always identical, free from human errors.

1. Presses need not operate in sequence. Each press is timed for the minimum cure for that particular size tire. Sequence of press openings need not be considered when mold changing is necessary.
2. Short, uniform cures are possible as the presses are open for the minimum amount of time, allowing molds and bags to stay hot.
3. Bag life becomes even greater since the bag does not cool down as much between cures. HISTORICALLY, OUR DIAPHRAGM LIFE HAS BEEN AT LEAST TWICE THAT OF COMPETITIVE BLADDER-TYPE PRESSES.
4. Automatic BAG-O-MATICS result in production increases of 10 to 15% over manually-operated installations.

In addition, this new AUTOMATIC BAG-O-MATIC has amazing versatility. It handles all passenger tires in rim diameters of 12" through 16", and will accept cross sections through the new 9.50 or 10.00 sizes.

The 40" Tilt-Back is, of course, built to unequalled, world-famous McNEIL precision and quality standards. This means that it is unsurpassed in design, engineering and production performance. It is as reliable, efficient and maintenance-free as only a McNEIL press can be. Your inquiry will be welcomed!

A. J. Michelson

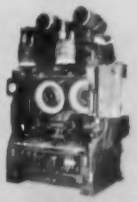
VICE PRESIDENT IN CHARGE OF SALES

THE NAME TO REMEMBER FOR PRECISION

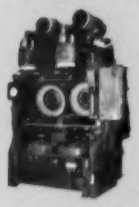
McNEIL AKRON

Manufacturers of the World's Finest Rubber Curing Equipment

1 Press opening — tires dropping on expanding loading chucks



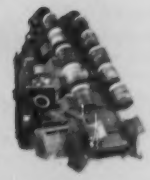
2 Press fully open — cured tires stripped from molds



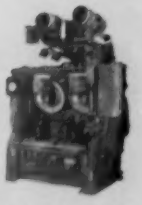
3 Cured tires held horizontally —

4 Lifting bar raises — tires discharged through rear of press

5 Tires move down rear rollers to belt conveyor



6 Rear view showing feeder conveyor

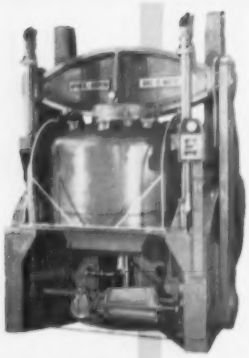


7 Press ready for automatic loading. Expanding chucks ready to drop uncured tires

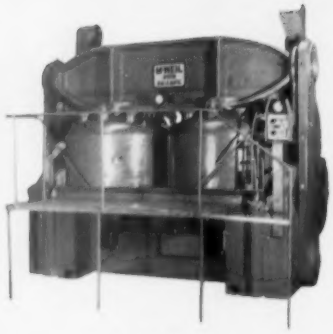
8 Uncured tires have dropped onto Bag-O-Matic bladders. Press now closes for next automatic operation

# Only McNEIL makes a Practical Profit-Producing Press for every type of Tire and Mechanical Goods Production

## TIRE PRESSES

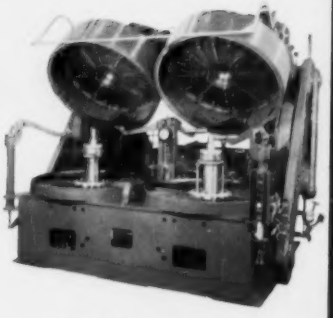


Model 900-75-25D
BAG-O-MATIC Tilt-Back



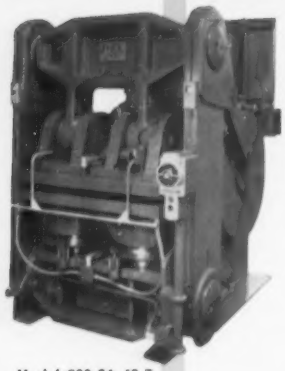
Model 450-55-16D
BAG-O-MATIC Tilt-Back

Model 275-45-10D
Twin BAG-O-MATIC



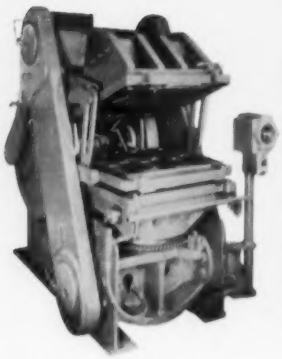
Model 300-47½-11½D
BAG-O-MATIC

## MECHANICAL GOODS PRESSES



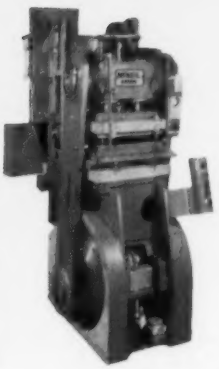
Model 800-24x48-7
Electrically
Heated Platen

Model 800-32
With Ejector



Model 800-32
Intermediate Platen

Model 300
Transfer
Molding Press



Model 150
Transfer
Molding Press

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New free-flowing Sterling MT is manufactured to the same exacting chemical specifications as regular MT, but through new mechanical processing methods, bulk density is increased 25-30%, cutting storage space requirements by 27½%. A 50 lb. bag of regular MT contains 1.35 cubic feet. The same quantity of free-flowing MT takes only 0.98 cubic feet of space.

Free-flowing Sterling MT looks and acts almost like regularly pelleted black. It flows more quickly and easily from the bag, incorporates faster into the batch and offers improved mixing characteristics with unchanged vulcanizate properties. Use of new MT results in easier handling, quicker weighing, better unit loads and cleaner and more economical plant working and storage conditions . . . yet new Sterling MT costs no more than regular MT. Why not specify the new Free-Flowing Sterling MT on your next Cabot order . . . contact your nearest Cabot sales office or write directly to the central offices.

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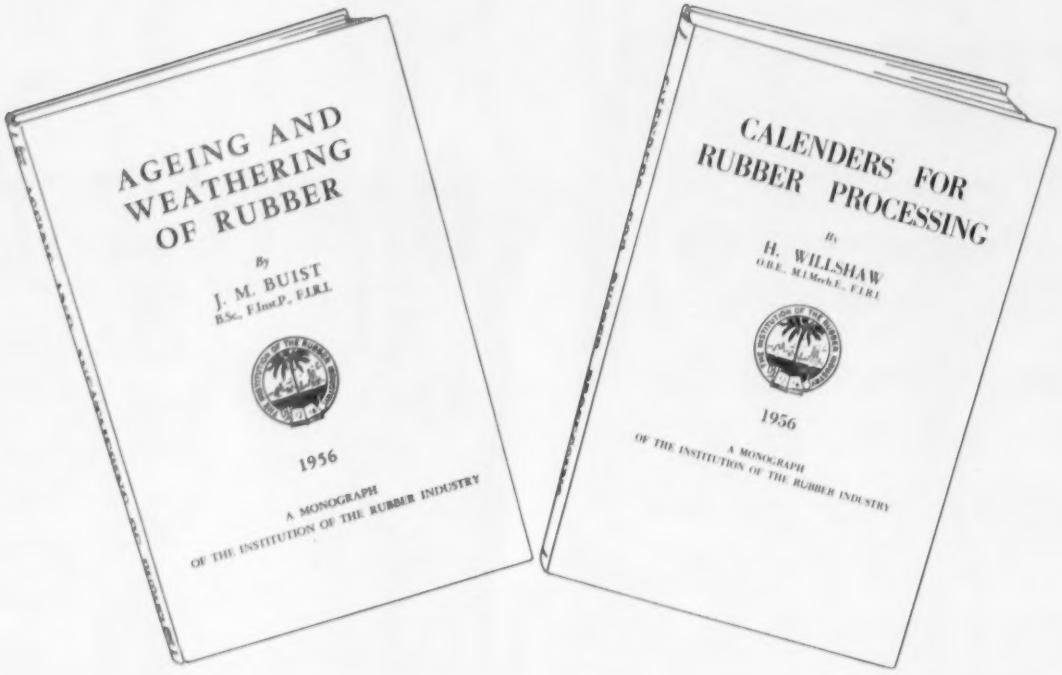
# *Two Valuable New Monographs for the Rubber Industry*




**AGEING AND WEATHERING OF RUBBER**—by J. M. Buist. This monograph, prepared under the auspices of the Institution of the Rubber Industry, London, England, is intended as a guide to the theory and practice of the aging and weathering of rubbers. Excellent progress has been made in recent years to improve the older techniques for studying this problem. Several refinements, which have enabled more reproducible results to be obtained, throw new light on how the degradation of rubber proceeds. The newer test methods present their own problems of interpretation, and the field of testing remains full of interesting and exciting research problems. Price: $4.00.

**CALENDERS FOR RUBBER PROCESSING**—by H. Willshaw. Also prepared under the auspices of the Institution of the Rubber Industry, this monograph describes the uses and developments of calenders in a manner that will appeal to all classes of persons engaged in the rubber industry. The discussion covers such subjects as calender design, types of calenders, ancillary equipment, roll contours, uses in production, and other pertinent information. This monograph has been compiled from the experiences of many persons engaged in the rubber industry. It is a full yet concise discussion complete with illustrations and a handy glossary which makes the volume of even greater value to the reader. Price: $4.00.

Still Available: **PNEUMATIC TYRE DESIGN**—by E. C. Woods. Still another monograph in the IRI series. A valuable addition to any rubber library. Price: $3.50.

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## (a.) SHRINKAGE?

## (b.) DIE SWELL?

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*for technical help!*

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It's good business to take advantage of Phillips rubber experience and processing know-how. We have the answers to many troublesome problems . . . how to control die swell, shrinkage, staining, etc.

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| COLD | PHILPRENE 1500<br>PHILPRENE 1502<br>PHILPRENE 1503 | PHILPRENE 1601<br>PHILPRENE 1605 |
| COLD OIL | PHILPRENE 1703<br>PHILPRENE 1706<br>PHILPRENE 1708<br>PHILPRENE 1712 | PHILPRENE 1803 |

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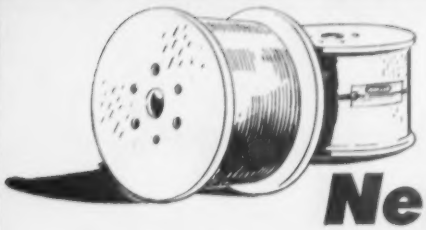
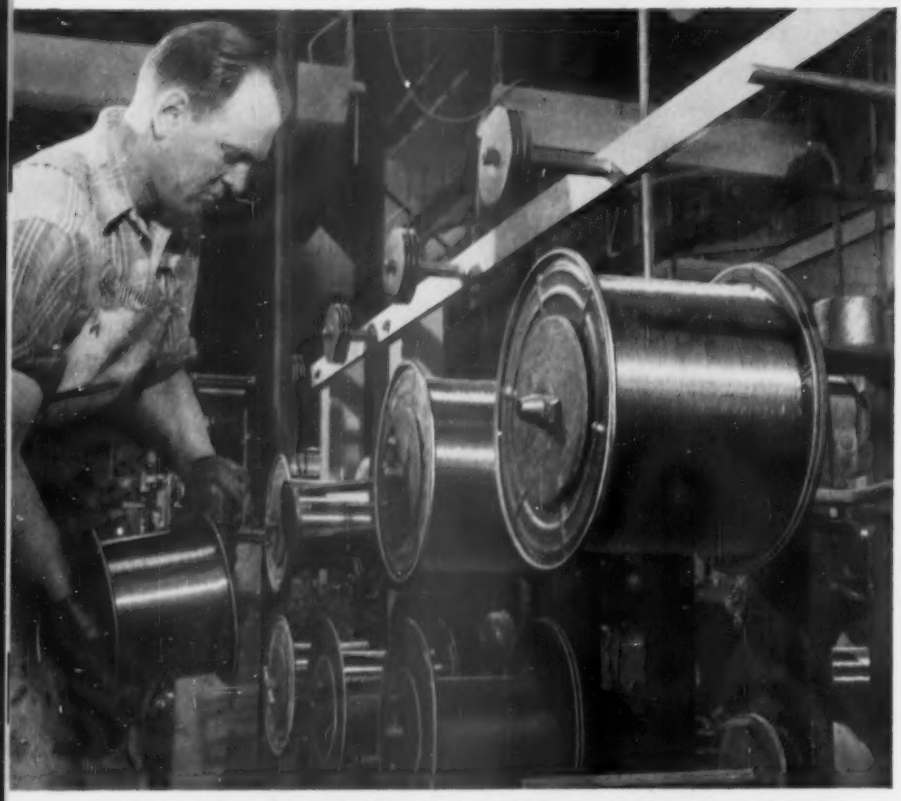


# *New* Discard-a-Spool

## Reduces Thermoid's Wire Rewind Loss to ½ of 1%



Light-weight Discard-a-Spool fits easily and quickly on let-off equipment.

Discard-a-Spool cut wire losses in rewinding to less than ½ of 1 per cent.

### Johnson Steel's New One-Way Spool Weighs 28 Ounces vs. 200 Ounces

In a mountain-lined valley in Utah, a year-long test of an improved method of packaging fine wire has been stamped "a complete success."

Thermoid Western Division Thermoid Company, Trenton, N. J., one of the nation's top manufacturers of wire-reinforced rubber hose, has given full approval to Johnson Steel & Wire Co.'s new Discard-a-Spool.

Light-weight, non-returnable Discard-a-Spool underwent testing in actual production at Thermoid's plant for many months. The result: now Thermoid specifies that all hose wire be delivered on new Discard-a-Spools.

Discard-a-Spool offers you these advantages over competitive packaging methods, whether made of metal or tempered Masonite:

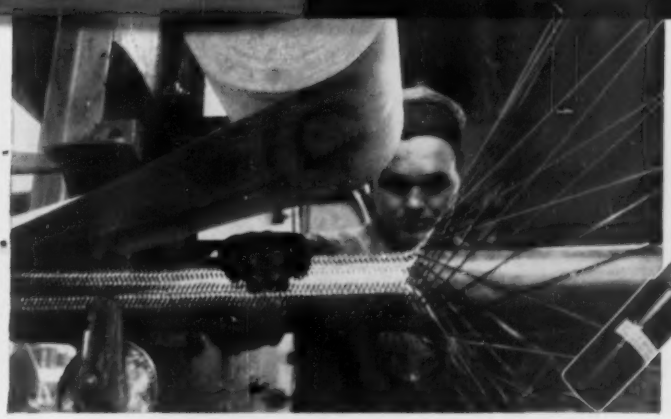
- **It weighs only 28 ounces** and slashes tare weight by 14 times.
- **Fully protects the high quality** hose wire from contaminants and in-shipment damages. Overlaps and tangles are eliminated, the wire's critical surface finish is guarded.
- **Shrinks Thermoid's wire losses** in re-winding to less than ½ of 1 per cent.

Through substitution of Discard-a-Spool for the heavier, must-be-returned steel spool formerly used, Thermoid computes substantial savings.

**A typical package of the new wire consists of 36 Discard-a-Spools in a sturdy, two-layer cardboard box. The box is steel-strapped to a wooden pallet for easy handling by fork-lifts. The entire package weighs approximately 2,385 pounds gross, or 2,250 pounds net, producing a tare weight of 135 pounds.**

Using outmoded, heavy spools, which weighed about 12½ pounds and had to be returned to the wire mill, tare weight was 1,023 pounds for the same quantity of wire.

- **Major Supplier**—In the past 21 years, Johnson Steel & Wire has become one of Thermoid's major suppliers of hose wire for a wide variety



Johnson's high-quality hose reinforcement wire is fabricated into braids which form plies of strength around rubber tubing. As many as four braids can be plaited into reinforced rubber hose. At right, cut-away section shows plies of wire separating layers of rubber.

Johnson Steel is a major supplier of the high quality hose reinforcing wire Thermoid Western uses at its Nephi, Utah, plant. For 18 months, Thermoid cooperated with Johnson Steel & Wire Co. in extensive production tests of the new Discard-a-Spool.

of high-strength rubber hoses.

At Nephi, Utah, Thermoid's hose wire braiding machines convert Johnson's wire into plaited sheaths around rubber tubing. The number of braids in a hose is determined by the end use of the hose. Thermoid builds dozens of different types of wire braided hose, ranging from $\frac{3}{16}$th inch to 4 inches in diameter. They vary from hose with a single ply, or layer, of plaited steel wire to 4 plies of practically unbreakable wire plaiting.

In a standard 50-foot length of four-ply, 2½ inch hose, 38.5 miles of Johnson wire is used, fitting it for tough hydraulic pressure jobs like core, water and oil well drilling and sand busting in the oil fields.

Without steel reinforcing, rubber hose has a bursting resistance of only about 50 p.s.i. In the case of half-inch reinforced hose, the first ply of braid raises bursting strength from 50 p.s.i. to 10,000 p.s.i. A second layer increases it to 16,000 p.s.i. These are minimum figures, since Thermoid actually builds its hoses so that breaking points are four times maximum working pressures on the hose.

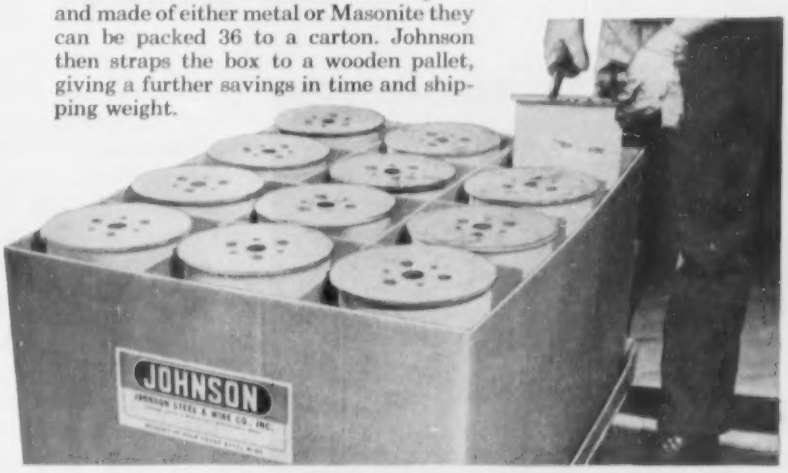
According to J. A. Muller, Thermoid's Director of Research and Development, the secret of building good hose rests on a number of factors. Among them is steel wire of high quality.

Thermoid selects Johnson wire because its structure meets or exceeds specifications. The wire surface is free of nicks which could cause premature fatigue stress or breakage during braiding operations.

• **Cleanliness Vital**—Good adhesion also requires a wire with a clean surface. To get superior adhesion Thermoid uses a dry assembly process for hose components.

These advantages of Johnson's wire are not the only benefits Thermoid gains. Johnson's products stay within the specified tensile ranges.

Discard-a-Spools are lighter and easier to handle than returnable hose wire spools and made of either metal or Masonite they can be packed 36 to a carton. Johnson then straps the box to a wooden pallet, giving a further savings in time and shipping weight.




Variations in tensile can cause serious trouble in the braiding operations.

"Any deficiency in the wire shows up in winding or during the braiding operation itself," Mr. Muller explains.

It takes up to eight hours to set up the 120 bobbins on the big braider. One bad wire is enough to jam the machine and the cost to get it set up again is figured at $245—$35 for labor and $210 for damaged and lost wire. The time lost adds still more expense.

The Utah plant, far from the nation's wire producing mills, requires tops in quality and service.

Thermoid's experience with Johnson Steel & Wire Co. demonstrates why you should let Johnson handle your fine wire supply problems.

Johnson's full range of specialty wires and its progressiveness are your guarantee of satisfaction. Let a Johnson specialist explain how top quality wire or the latest packaging improvement—like the new Discard-a-Spool—can eliminate your worries. The Johnson man is experienced and willing. He's as close as your telephone. Give him a call today.

## Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

*a subsidiary of* **Pittsburgh Steel Company**

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| ½ page | 110 |
| ¼ page | 65 |
| 2 pages, each | 195 |
| 2 half pages, each | 107 |
| 2 quarter pages, each | 63 |
| Colors, Red | extra 75 |
| Other Colors | extra 100 |
| Bleed Pages | extra 25% |

**Sales Agents Section:**

In addition to standard one-quarter, one-half and full page units, there is available in the Sales Agents and Branch Offices Section only, a one inch unit @ $38.

*For complete rates and sizes write for 1957-58 rate card.*

**When new men come into the field (or old-timers need help), they invariably turn to the RUBBER RED BOOK for information on sources of supply. Your advertisement, available for study at this critical moment, is just like having your salesman present when buying decisions are being made. Your ad will last for two full years in the most widely used reference book in the field. It will be a constant reminder of your products . . . materials . . . equipment . . . services.**

**In one recent month alone, RUBBER AGE carried notices of more than 100 personnel changes in the rubber industry. Multiply this by the 24 month life of the RUBBER RED BOOK and you'll have some idea of the number of new people who will enter the field while the 1957-58 edition is being used. This long life and intensive use makes for unparalleled economy and effectiveness, and helps to explain why each edition attracts more advertisers. In the last issue, 400 of the industry's top suppliers used space, and reservations on hand for the next edition indicate an even greater number.**

**RUBBER AGE** . . . . . **19** . . . .

**101 West 31st St., N. Y. 1, N. Y.**

You are hereby authorized to insert in the 1957-58 Edition of the RUBBER RED BOOK the advertising of the undersigned to occupy the space of _____ _____ for which we agree to pay $_____ as per your 1957-58 rates. (Copy will be sent you before April 15, 1957.)

FIRM NAME _____

ADDRESS _____

SIGNED BY _____ TITLE _____

257

## RESERVE SPACE NOW

**Make certain that you have "job change protection." Arrange now for enough advertising space in the 1957-58 RUBBER RED BOOK to adequately advertise your company's products. Use the convenient coupon below or send in your own purchase order, but don't delay, do it now.**

**Publication date: June, 1957. Closing date: April 15, '57**

*Published by*

**RUBBER AGE**

**101 West 31st Street • New York 1, New York**

*Photo courtesy Certified Creations, Inc., New York, N. Y.*

# Here's the key to colorful foamed rubber

Being cellular makes foamed rubber difficult to protect from oxidation. Some staining antioxidants are effective, but of little value since most uses for foam rubber require bright, clean colors.

Take the distinctively colored, snug-fitting, washable coasters pictured above. They would quickly lose their appeal and utility if they discolored or were inadequately protected. But they won't, thanks to WING-STAY S, the truly nonstaining antioxidant.

WING-STAY S is a liquid phenol-styrene derivative which is not extracted by water in foam latex and is nonvolatile in the large surface area of foam rubber. It is highly resistant to heat, sunlight and age—protects without odor, migration or discoloration.

Full details on WING-STAY S plus the latest Tech Book Bulletins are yours by writing to: Goodyear, Chemical Division, Akron 16, Ohio.

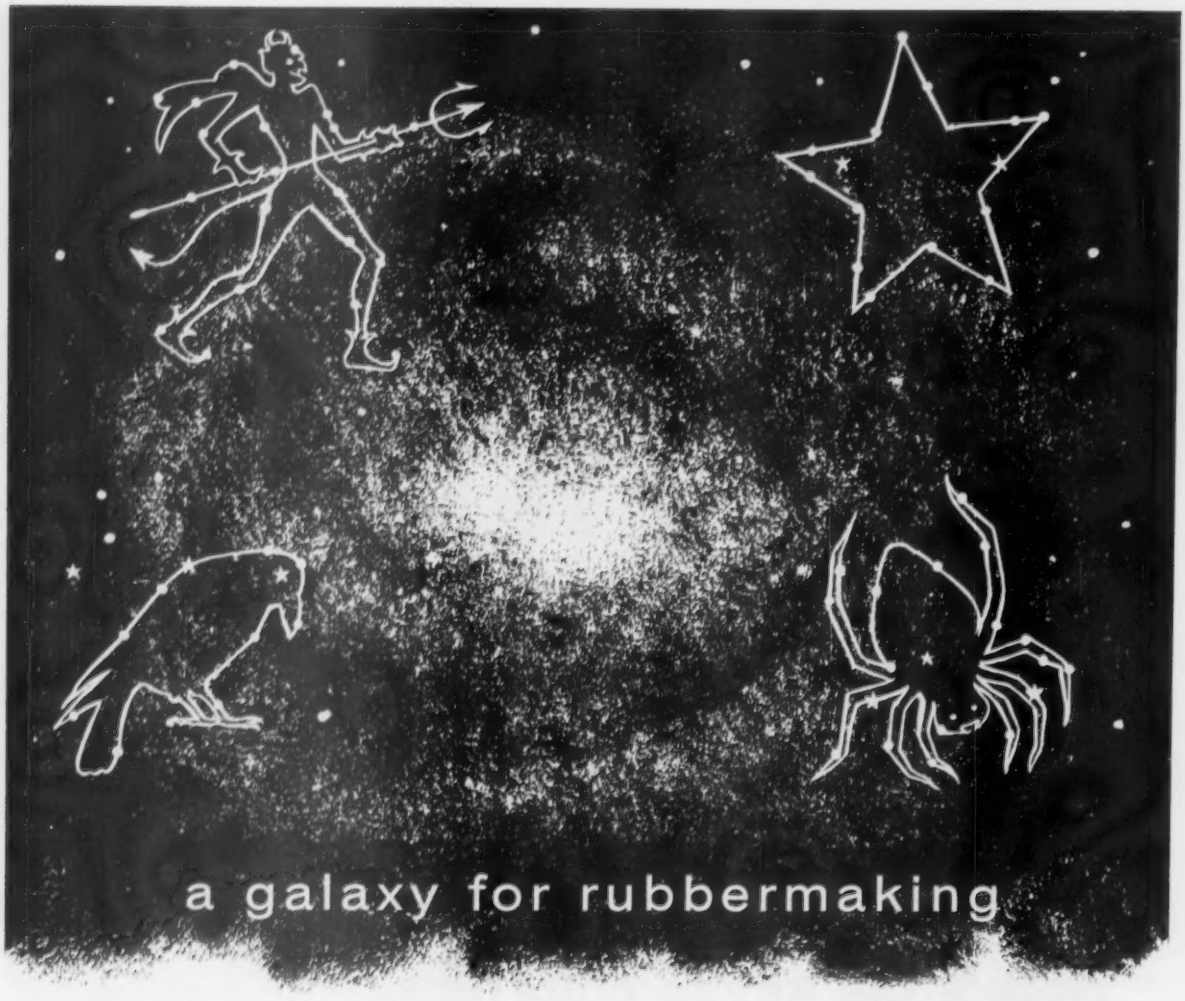
CHEMICAL
GOODYEAR
DIVISION

RUBBER & RUBBER
CHEMICALS DEPARTMENT

Chemigum, Plioflex, Pliolite, Plio-Tuf, Pliovic, Wing-Stay—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

CHEMIGUM • PLIOFLEX • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS

High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries




# MATHIESON SULFURS

**DEVIL BRAND**

ground crude sulfur 99.5% min. purity
Grade A—90% passing 200-mesh
Grade AA—97% passing 200-mesh
50-lb. triple-wall paper bags

**BLACKBIRD BRAND**

ground crude sulfur with .5% carbon black added
99% min. purity
98-100% passing 325-mesh
50-lb. triple-wall paper bags

**STAR BRAND**

ground refined sulfur 99.9%-100% pure
Grade A—90% passing 200-mesh
Grade AA—97% passing 200-mesh
50-lb. triple-wall paper bags

**SPIDER BRAND**

ground crude sulfur with conditioner added
97% min. purity
98-100% passing 325-mesh
50-lb. triple-wall paper bags

Mathieson also offers a full line of conditioned, oil-treated sulfurs for the rubber industry. For complete information call your Olin Mathieson representative or write today.

MATHIESON CHEMICALS
OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD.

Devil®, Blackbird®, Spider® and Star are Olin Mathieson Trademarks

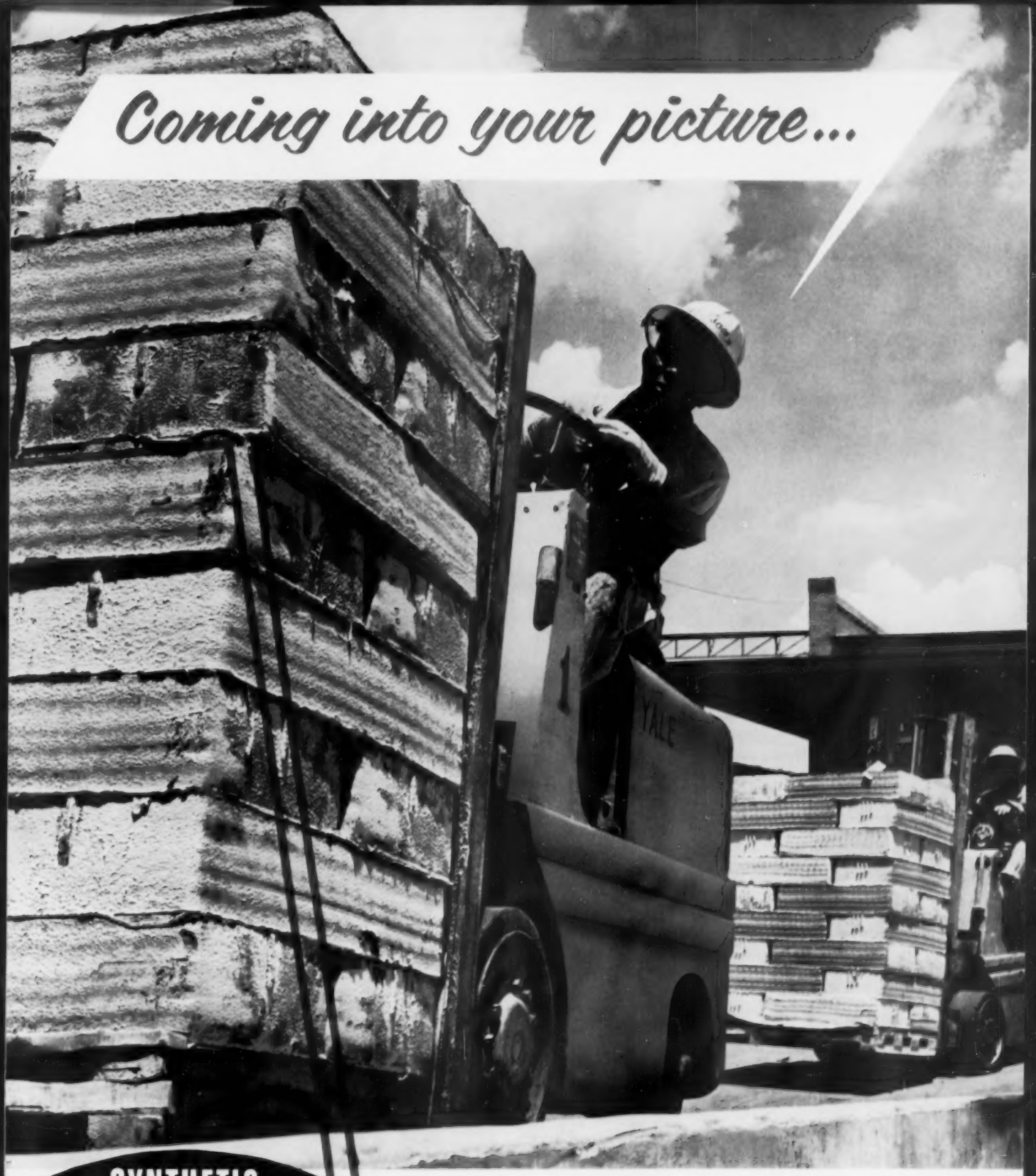
4721

MATHIESON

**INORGANICS:** Ammonia · Bicarbonate of Soda · Carbon Dioxide · Caustic Potash · Caustic Soda · Chlorine · Hydrazine and Derivatives · Hypochlorite Products · Muriatic Acid · Nitrate of Soda · Nitric Acid · Soda Ash · Sodium Chlorite Products · Sulfate of Alumina · Sulfur (Processed) · Sulfuric Acid

**ORGANICS:** Ethylene Oxide · Ethylene Glycols · Polyethylene Glycols · Glycol Ether Solvents · Ethylene Dichloride · Dichloroethylether · Formaldehyde · Methanol Sodium Methylate · Hexamine · Ethylene Diamine · Polyamines · Ethanolamines · Trichlorophenol · Surfactants

*Coming into your picture...*




SYNTHETIC
BAYTOWN
RUBBER

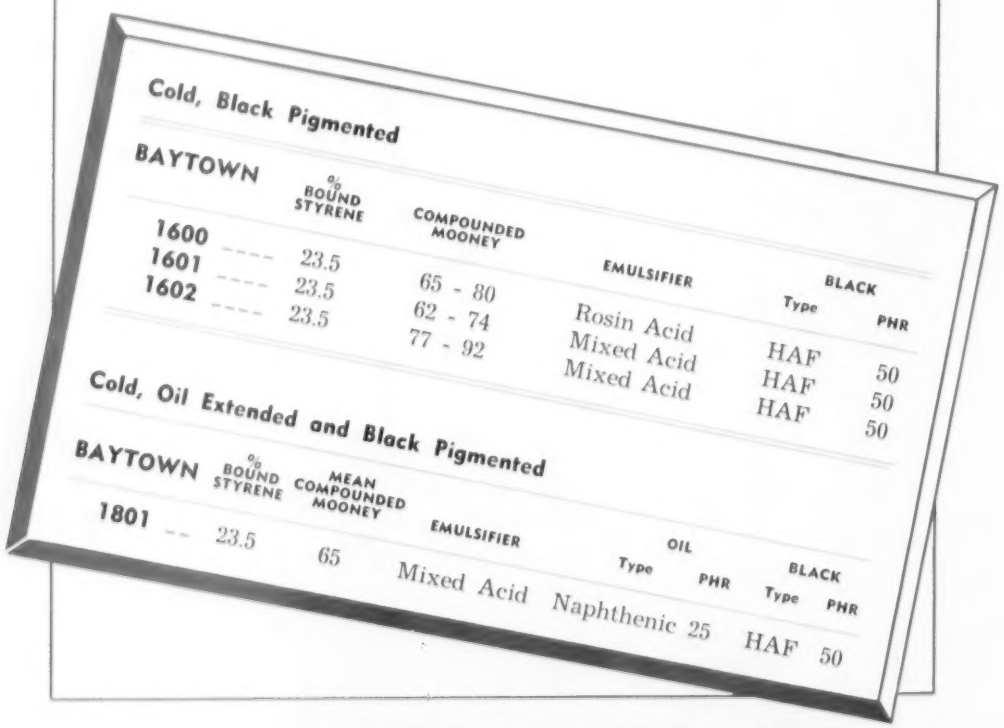
MASTERBATCHES
*RUBBERS OF SCIENCE*

UNITED CARBON COMPANY, INC.

**BAYTOWN MASTERBATCHES**, manufactured at Baytown, Texas, by *United Rubber & Chemical Company*, have demonstrated their utility and reliability in factories both here and abroad.

THESE HAF MASTERBATCHES are widely used in tread stocks and other tire applications. They find particularly effective use in the manufacture of camelback, and also have proved their excellence in the production of high quality mechanical goods and other molded products.

THEY ARE AVAILABLE in the following formulations:



**Cold, Black Pigmented**

| BAYTOWN | % BOUND STYRENE | COMPOUNDED MOONEY | EMULSIFIER | BLACK Type | BLACK PHR |
|---|---|---|---|---|---|
| 1600 | 23.5 | 65 - 80 | Rosin Acid | HAF | 50 |
| 1601 | 23.5 | 62 - 74 | Mixed Acid | HAF | 50 |
| 1602 | 23.5 | 77 - 92 | Mixed Acid | HAF | 50 |

**Cold, Oil Extended and Black Pigmented**

| BAYTOWN | % BOUND STYRENE | MEAN COMPOUNDED MOONEY | EMULSIFIER | OIL Type | OIL PHR | BLACK Type | BLACK PHR |
|---|---|---|---|---|---|---|---|
| 1801 | 23.5 | 65 | Mixed Acid | Naphthenic | 25 | HAF | 50 |

# UNITED CARBON COMPANY, INC.

A subsidiary of United Carbon Company

CHARLESTON 27, WEST VIRGINIA

NEW YORK · AKRON · CHICAGO
BOSTON · LOS ANGELES · MEMPHIS

IN CANADA: CANADIAN INDUSTRIES LIMITED

# SYNTHETIC RUBBER

## *is a product of the West, too!*

ADD SYNTHETIC RUBBER to the many bounties of the West! Shell Chemical's plant at Torrance, California, produces a full line of butadiene-styrene type synthetic rubber to fill the needs of large and small Western manufacturers.

Next time, try Shell synthetic rubber, available in a variety of solid types and liquid latices. It can do a better job for you.

Convenient location and diversity of product make Torrance your logical source for synthetic rubber West of the Rockies. In addition, Shell's Technical Service Laboratory is ready to help you find practical solutions for troublesome technical problems.

Think of Torrance, California, whenever you need synthetic rubber. Our phone number in Los Angeles is FAculty 1-2340.

**SHELL CHEMICAL CORPORATION**

Synthetic Rubber Sales Division
P. O. Box 216, Torrance, California

SHELL

**For ease of**

- *Handling*
- *Weighing*
- *Processing*
- *Incorporating in batch*

# POLYMEL DX-111 POWDER

## *Properties*

| | |
|---|---|
| Natural State | Powder |
| Color | Amber |
| Specific Gravity | 1.11 |
| Melting Point | Pressure Sensitive |
| Composition | Modified Polystyrene |
| Odor | Characteristic |
| Toxicity | Not known to be toxic |

## *Prices*

**fob Baltimore**

| | |
|---|---|
| 1 drum to 4900 lbs. | .1425¢ lb. |
| 5000 lbs. to truckloads | .1375¢ lb. |
| Truckloads | .1325¢ lb. |

## *A Representative Inexpensive Tan Heel Compound*

| | *Lbs.* | *Oz.* |
|---|---|---|
| 1703 GR-S | 75 | — |
| Chocolate Recl. | 75 | — |
| M. R. | 24 | — |
| **Polymel DX-111 Powder** | **15** | — |
| Red Oxide | 4 | — |
| Altax | 2 | — |
| M. Zimate | — | 4 |
| Hard Clay | 100 | — |
| Zeolex #23 | 25 | — |
| Circo L. P. | 12 pts. | — |
| Sulphur | 3 | 4 |
| Specific Gravity | 1.50 | |
| Shore Hardness | 70 | |
| Abrasion | 23 | |
| Approx. Cost | $.085 | |

EXCELLENT PROCESSING

*We do not guarantee the above formula because of the variable factors involved.*

**MANUFACTURERS OF**

**compounding ingredients for reinforcing plasticizing, extending, and processing natural and synthetic elastomers.**

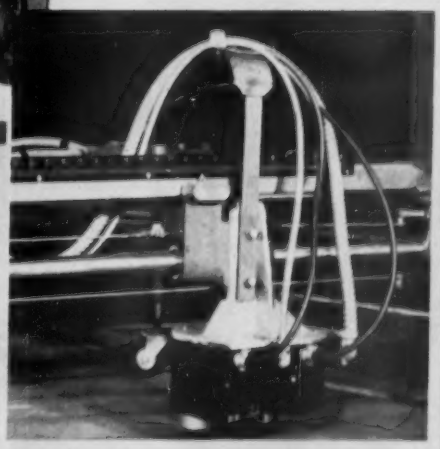
THE Polymel CORPORATION

**2238 Eastern Avenue, Baltimore 31, Maryland, EAstern 7-1335**

NRM

# FULLY AUTOMATIC BIAS CUTTERS

- SPEED PRODUCTION
- INCREASE ACCURACY
- REDUCE WASTE



## ELECTRONIC "CONTROL HEAD" ASSURES FASTER, MORE PRECISE OPERATION

A unique double scanner system, together with many other advanced design features, combine to make this NRM fully automatic horizontal Bias Cutter the most efficient machine available for fabric and ply cutting operations.

Simple, quick adjustments for cutting blocks of stock from 11" to the maximum required, are a feature of both the 66" and 72" tables. Cutting angles are from 45 to 90 degrees. Block widths may be read direct from the calibrated scale on the cutter bar, regardless of the cutting angle. Standard over-all dimensions of tables in 5' increments are from 20' to 80'. Speed of the cutting cycle is standard at 20 cuts per minute, within plus or minus 1/32".

At no obligation we will supply complete details on the fully automatic Bias Cutter. Get the facts and see for yourself *why* stock preparation with NRM Bias Cutters is more accurate and efficient.

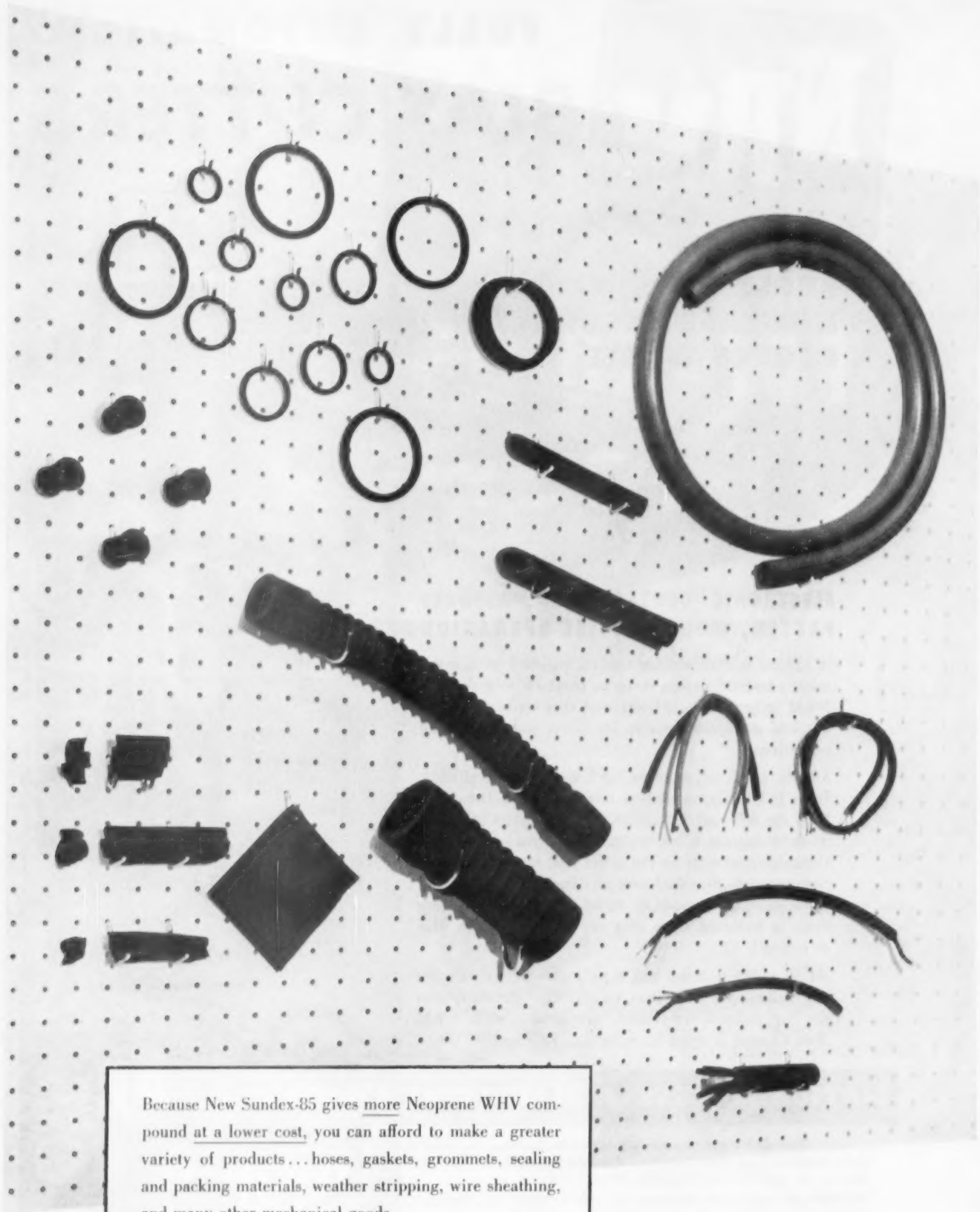
*Check* your rubber machinery needs against the NRM complete line *Today!*

**NATIONAL RUBBER MACHINERY COMPANY**

NRM

General Offices and Engineering Laboratories: 47 W. Exchange St., Akron 8, Ohio
EAST: Plants at Akron and Columbiana, Ohio and Clifton, N. J.
WEST: S. M. Kipp, Box 441, Pasadena 18, Cal.
MID-WEST: National Rubber Machinery Co., 5875 N. Lincoln Ave., Chicago 5, Ill.
EXPORT: Gillespie & Company, 96 Wall St., New York 6, N. Y.

ENCOURAGE OUR YOUTH To CONSIDER The OPPORTUNITIES In ENGINEERING and SCIENCE



Because New Sundex-85 gives more Neoprene WHV compound at a lower cost, you can afford to make a greater variety of products... hoses, gaskets, grommets, sealing and packing materials, weather stripping, wire sheathing, and many other mechanical goods.

# NEW SUNDEX-85 CAN GIVE YOU MORE PRODUCT PER POUND OF NEOPRENE WHV

By using high loadings of new Sundex®-85, you can lower the cost of your Neoprene WHV compound and still retain the properties that make neoprene outstanding for oil-resistant mechanical goods.

As much as 100 parts of Sundex-85 to 100 parts of neoprene hydrocarbon have been used successfully. Sundex-85 also conditions the compound for easy handling during processing.

Even with unusually high loadings of Sundex-85, neoprene products maintain their high resistance to oil, grease, ozone, heat, and sunlight. It helps assure quality in oil-resistant automotive and industrial hose, sealing and packing materials, gaskets, grommets, and other molded goods where cost is a strong factor.

Sundex-85 is compatible with neoprenes, natural rubber, butadiene-styrene type, and acrylonitrile polymers. Here are some of its typical properties:

| | |
|---|---|
| Viscosity, SUS at 210F | 90 |
| Specific gravity at 60F | 1.017 |
| Refractive index, $n_D^{20}$ | 1.5869 |
| Aniline point, deg F | 90 |
| Color | Dark |

**FOR COMPLETE INFORMATION** about Sundex-85, ask your Sun representative, or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. RA-2.

SUNOCO®

© Sun Oil Company

**INDUSTRIAL PRODUCTS DEPARTMENT**

## SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: Sun Oil Company Limited, Toronto and Montreal • IN BRITAIN: British Sun Oil Company Ltd., London W.C.2, England • THE NETHERLANDS: Netherlands Sun Oil Company, Rotterdam C, The Netherlands • WESTERN EUROPE (except the Netherlands), NEAR EAST, NORTH AFRICA: Sun Oil Company (Belgium) S.A., Antwerp, Belgium.

**HOW THE SILICONES MAN HELPED...**

## *Deliver a Hot Blast to Cold Jets!*

Get 'em into the air *fast!* But, complex machinery must be warmed up . . . and pumping high temperature, high pressure air into the jet engine melts ordinary hoses. The solution: A tough, flexible hose with two inner layers of high temperature silicone rubber bonded to an outer cover of closely woven "Dacron" fiber.

Developed by Quaker Rubber Division, H. K. Porter Company, Inc., Philadelphia, Pa., this hose utilizes UNION CARBIDE Silicone Rubber to resist temperatures from +450 to —80 deg. F. Weighing less than one pound per foot, it offers great flexibility for ease of handling, and is highly resistant to abrasion.

This is another example of how the UNION CARBIDE Silicones Man has helped solve an "impossible" problem. A booklet—"Look to UNION CARBIDE for Silicones"—describes silicone rubber and many other silicone products. Write Dept. RA-2 today. Silicones Division, Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y.

UNION CARBIDE
Trade-Mark
SILICONES

The term "Union Carbide" is a trade-mark of Union Carbide and Carbon Corporation

—with an eye to your future . . .

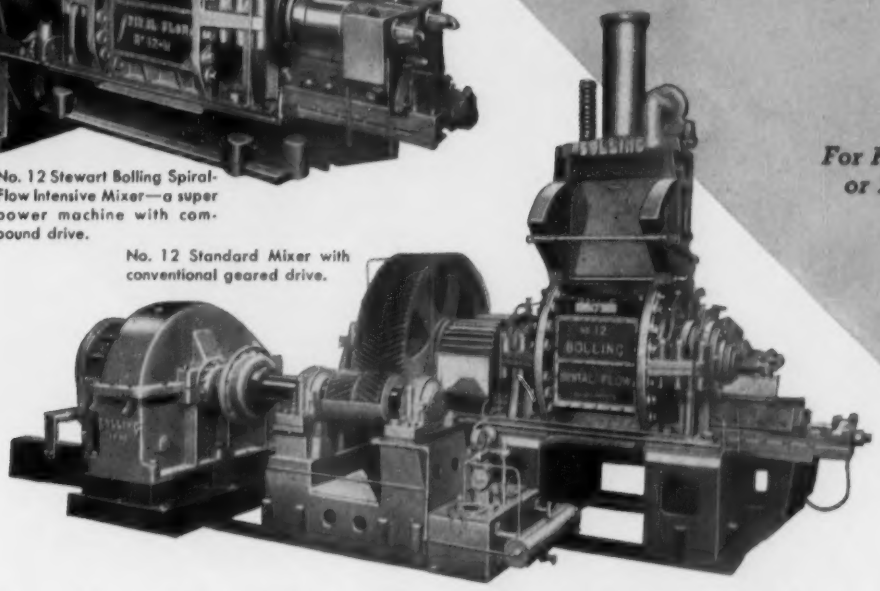
INVESTIGATE FIRST OR LAST

STEWART BOLLING

Spiral-Flow

INTENSIVE MIXERS

No. 12 Stewart Bolling Spiral-Flow Intensive Mixer—a super power machine with compound drive.



No. 12 Standard Mixer with conventional geared drive.

*For Rubber or Plastics*

## The Complete Line that meets tomorrow's production today!

*Bolling builds 4 production sizes for a range of capacities: No. 3 (3400 cu. in.), No. 4 (5100 cu. in.), No. 10 (12160 cu. in.), No. 12 (16000 cu. in.). Also one production-laboratory model —No. 1B (1200 cu. in.). Also one laboratory model—No. 0 (275 cu. in.).*

In Bolling mixers, laboratory or production size, you get:

*Spiral-Flow Sides* for the heating or cooling of stock, which give greater thermal efficiency . . . *Split End Frames* which permit rotor removal without completely dismantling ends of machine . . . *Anti-Friction Bearings* for optimum power, smoother running, and longer life. No end zone movement of rotors . . . Stewart Bolling production mixers offer other outstanding advantages for profitable operation; rotors with full circle end flanges; compound, dual or conventional geared drives, and other features.

*Write on your letterhead for Mixer Bulletin*

B STEWART BOLLING & COMPANY, INC.

3194 EAST 65th STREET • CLEVELAND 27, OHIO

• INTENSIVE MIXERS AND MILLS • CALENDERS • REFINERS • CRACKERS HYDRAULIC PRESSES • PUMP UNITS BALE SLITTERS • SPEED REDUCERS

# Fabric helps shield watchful eyes on the "Texas Tower"

From this radar picket station 110 miles out in the Atlantic, land defenses will receive advance warning of approaching aircraft. The "Texas Tower" shelters its sensitive "eyes" in strange-looking balloons called "radomes," capable of withstanding the fiercest gales, yet without blocking the radar's "view." Fabricated by Firestone Tire & Rubber Co., the radomes are made of rubberized nylon actually "supported" by additional interior air pressure. And the nylon fabric, we are proud to say, was engineered for this purpose by Wellington Sears.

Fabrics for such rubberizing applications are only part of the long list provided to all kinds of industry by Wellington Sears over more than a century. Whatever your problem may be, if it involves fabric for coating—or "working" fabrics of any kind, cotton or synthetic—turn to Wellington Sears for able, experienced help.

For informative booklet, "Modern Textiles for Industry," write Dept. G-2.

## Wellington Sears

***FIRST In Fabrics For Industry***

*For Mechanical Goods, Coated Materials, Tires, Footwear and Other Rubber Products*

WEST POINT PEPPERELL

**Wellington Sears Co., 65 Worth St., New York 13, N. Y. • Atlanta • Boston • Chicago • Dallas • Detroit • Los Angeles • Philadelphia • San Francisco • St. Louis**

# *more for today... and tomorrow*

Petro-Tex is a "growth company" in every sense of the words... additional capacity, expanding product lines and aggressive application research.

While providing substantially greater butadiene output for present and prospective users, we also will soon have pure isomers of n-butylene 1 and n-butylene 2 at attractive prices for new markets and products. Other butane-derived products and applications are being investigated.

Petro-Tex will do everything possible to foster broader development and use of polymers and copolymers based on these four-carbon chemical building-blocks.

**BUTADIENE**

## PETRO-TEX CHEMICAL CORPORATION

HOUSTON 1, TEXAS

JOINTLY OWNED BY

TENNESSEE GAS TRANSMISSION COMPANY AND FOOD MACHINERY AND CHEMICAL CORPORATION

# Thiokol Announces New Butyl Rubber Development Program

## New team of experienced rubber chemists will work with manufacturers for effective production methods on new BUTYL applications.

Thiokol, in conjunction with Petroleum Chemicals, Inc., has formed a special team of rubber chemists to help broaden markets where BUTYL rubber offers favorable economic and product properties . . . to help rubber manufacturers in developing desired product characteristics . . . and to bring into profitable reality the tremendous potential of the BUTYL rubber market. Because of Thiokol's great confidence and belief in the future of BUTYL, the personnel and facilities have been carefully selected to provide the most proficient development.

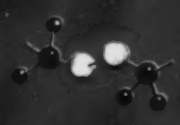
You'll find these Thiokol representatives are well experienced in rubber technology. They have fully staffed and equipped technical and research laboratories at their command. It is their desire to supply you with the latest technical information on BUTYL rubber. Consider them a part of your own staff . . . an able and willing addition to your own technical facilities.

Be sure you have the latest technical data available through Thiokol. And, be certain your Thiokol technical representative is aware of your program. You'll find him as eager as you are to develop and improve your products and markets. To bring your technical file up-to-date, tear out and mail the attached coupon to: Thiokol Chemical Corporation, 780 North Clinton Ave., Trenton 7, New Jersey.

Technical Service Representatives

Technical Service Laboratory

Research



***THIOKOL—Pioneer Manufacturer of Synthetic Rubber***

## KEY MEMBERS OF THIOKOL'S BUTYL DEVELOPMENT TEAM

JOHN T. DUNN
Manager of Butyl Sales

WALTER E. BOSWELL
West Coast

WAYNE S. CHURCHILL
West Coast

ROBERT W. LEA
Midwest

ERNEST L. PUSKAS
Mid Central States

V. H. PERRINE
East Coast

E. J. CAIRE
East Coast

ROBERT J. GRAHAM
New England

C. R. PARCK

G. A. KANAVEL

J. J. PRENDERGAST

E. W. PETTES

DR. MORRIS B. BERENBAUM

Thiokol®

**THIOKOL CHEMICAL CORPORATION**
780 North Clinton Ave. • Trenton 7, New Jersey

*®Registered Trademark of the Thiokol Chemical Corporation for its liquid polymers, rocket propellants, plasticizers and other chemical products.*

THIOKOL CHEMICAL CORPORATION
780 NORTH CLINTON AVE
TRENTON 7, NEW JERSEY

*Please send me your BUTYL rubber technical file. I am particularly interested in the use of BUTYL rubber for*

_____
(application)

NAME _____ TITLE _____

FIRM _____

ADDRESS _____

CITY _____ STATE _____

*A round dozen*

# PLUS-VALUES

*for hard and semi-hard Buna-N stocks*

● Discover the impressive effects Durez phenolic resins can have on your operations . . . in improved processing, in enhanced end-product properties.

For example, we list above the benefits being obtained with a group of these resins developed for incorporation with Buna N's. The resins are completely compatible with synthetic rubber of this type and serve as plasticizers at processing temperatures. Owing to chemical reactivity, they contribute strongly to vulcanization, reinforcement, hardness, stiffness, abrasion resistance, and other characteristics desired in hard and semi-hard Buna N stocks.

Other Durez phenolic resins are recommended for specific advantages . . . with GRS in shoe sole and heel stocks, with natural rubber and Neoprene molding compounds, and in both air-dry and thermosetting adhesives.

Our experience as pioneers in perfecting resins for the rubber industry is at your service. For more information on how they can help to solve specific problems, write, giving details please.

DUREZ®

*Phenolic Plastics for the Rubber Industry*

**DUREZ PLASTICS DIVISION**

HOOKER ELECTROCHEMICAL COMPANY
102 WALCK ROAD, NORTH TONAWANDA, N. Y.

HOOKER CHEMICALS PLASTICS

# *if you use* ANILINE

## here are 4 good reasons to specify NATIONAL!

Now there are four big reasons why Aniline users should make National their first source of supply.

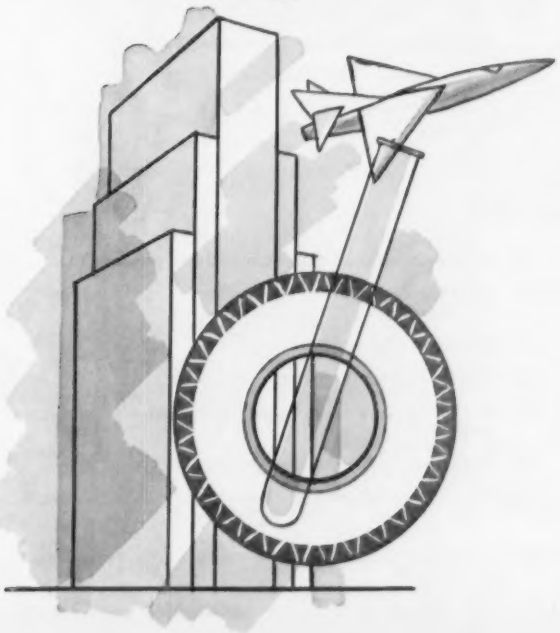
**QUALITY**—Our Moundsville Aniline is water-white, clear and exceptionally pure. It exceeds A. C. S. specifications for C. P. Aniline.

**UNIFORMITY**—By National Aniline's continuous hydrogenation process. Absolute uniformity is assured by automatic instrumentation.

**DEPENDABLE SUPPLY**—Recently doubled capacity provides an ample supply to meet the demands of quality-minded Aniline users.

**PROMPT DELIVERY**—From our strategic location on the Ohio River just south of Wheeling, West Va., we make fast shipments by rail, truck or inland waterway.

We will be pleased to furnish samples, specifications, price and delivery quotations.

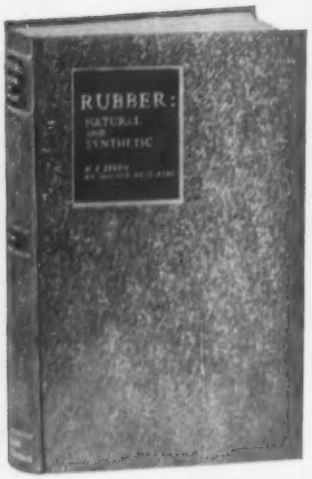


**NATIONAL ANILINE DIVISION**
**ALLIED CHEMICAL & DYE CORPORATION**
**40 RECTOR STREET, NEW YORK 6, N. Y.**

Akron Atlanta Boston Charlotte Chattanooga Chicago Columbus, Ga. Greensboro Los Angeles New Orleans Philadelphia Portland, Ore. Providence Richmond San Francisco Toronto

Allied Chemical

*first edition...*




491 Pages — 200 Illustrations

# RUBBER:

## Natural and Synthetic

By H.J. STERN

B.Sc., Ph.D., A.R.I.C., F.I.R.I.

**Price: $12.00*** (in U. S. and Canada)

**(Orders for all other countries should be sent with remittance of 75s. 0d. to the publisher: MACLAREN & SONS, LTD., Stafford House, Norfolk Street, London, W.C.2, England).**

### *About the Book—*

This book fills the need for an English-language text book on all phases of rubber and rubber products manufacture. As indicated by the chapter heads, the book is of interest to rubber manufacturers, suppliers of chemicals and machinery, rubber technologists and to students of rubber who will find present-day technical procedures clearly defined.

Part I covers natural rubber production, composition, properties and vulcanization as well as compounding ingredients, machinery, reclaiming and latex. Part II covers the development, manufacture and uses of synthetic rubber and latices, synthetic resins and plastics. In addition the manufacture of various rubber products are fully covered, including soles and heels, extruded goods, bonding, hollow goods, sponge and expanded rubber, belting, hose, tires, tubes and hard rubber.

**Purchasers in the United States and Canada may use the coupon below or their own purchase orders.**

**RUBBER AGE,** .....**19...**
**101 West 31st St.,**
**New York 1, N. Y.**

**Please send me a copy of Stern's "Rubber: Natural and Synthetic" @ $12.00*.**

**....Remittance enclosed. ....Send invoice.**

**Name** .....

**Address** .....

.....

(*) Add 3% for N. Y. City addresses.

### *About the Author—*

Dr. Stern has been engaged as a chemist in the rubber industry for more than 25 years and since 1935 has practiced successfully in London as a Consultant. He is the author of "Practical Latex Work" and of many publications concerned with the scientific and technological aspects of natural and synthetic rubber.

**SUMMARY OF CONTENTS BY CHAPTERS**

**Part I**

1. **Historical Introduction; Mastication; Vulcanization.**
2. **Plantation Rubber.**
3. **Natural Rubber: Composition, Reactions, Derivatives.**
4. **Properties of Vulcanized Rubber.**
5. **Compounding Ingredients.**
6. **Rubber Machinery; Solvents and Solutions; Reclaiming.**
7. **Latex.**

**Part II**

8. **Synthetic Rubber (History and Development).**
9. **Manufacture and Technology of Synthetic Rubbers.**
10. **Synthetic Rubber Latices.**
11. **Synthetic Resins; Plastics.**
12. **Manufacturing Processes (of various rubber products).**
13. **Testing and Analysis.**

**Sources of Further Information; Metric Equivalents; Subject Index.**

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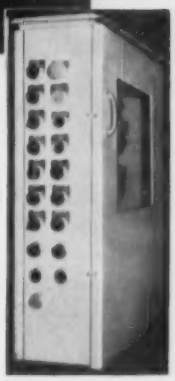

Pictured above is one of the EEMCO Presses installed at Applied Plastics. This press has platen area of 36" x 36" and capacity of 314 Tons.

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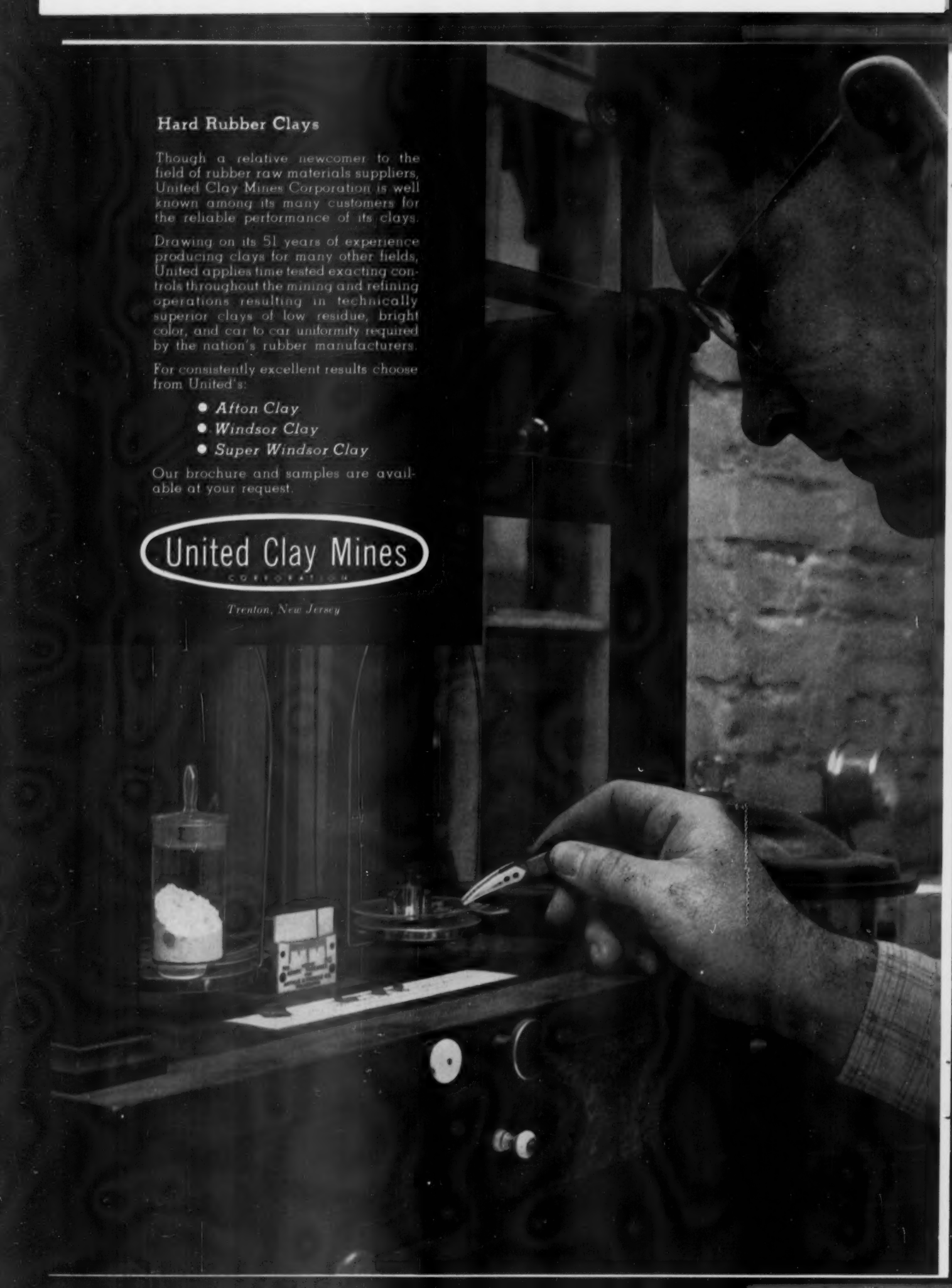

# 233

## BEST IN TRANSPARENT RUBBER, TOO

HI-SIL®

Interest has increased greatly during recent months in transparent rubber stocks for "crepe" soling and other specialty molded goods.

Columbia-Southern anticipated this interest years ago and set up an extensive research project in the transparent rubber field. The results are now published (*Rubber Age*, January 1957) and will soon be reprinted in our technical bulletin series. If you are not on our regular mailing list, you may reserve a copy by addressing Room 1929A at Pittsburgh or any of our district sales offices.

Tests indicate Hi-Sil 233 to be the best available reinforcing pigment for transparent applications. Commercial stocks with an excellent level of physicals can be produced as transparent compounds with this specific reinforcing silica.

Loadings as high as 97.5 parts (50 volumes) still give excellent transparency in PLIOFLEX* 1778, a new oil-extended polymer. This stock will whiten when flexed, but aptly demonstrates the limits that can be reached. Reducing the pigment loading in PLIOFLEX 1778 to 40 volumes (78 parts) results in a useful compound of middle 80 Durometer hardness. At lower loading levels, other GR-S types are suitable.

A serious investigation of color in transparent compounds was beyond the scope of this work. However, preliminary efforts showed that production of colored stocks is completely practical.

Technologists and others who may be intrigued by transparent rubber possibilities are invited to contact us today for more information.

*PLIOFLEX—TM, The Goodyear Tire & Rubber Co.

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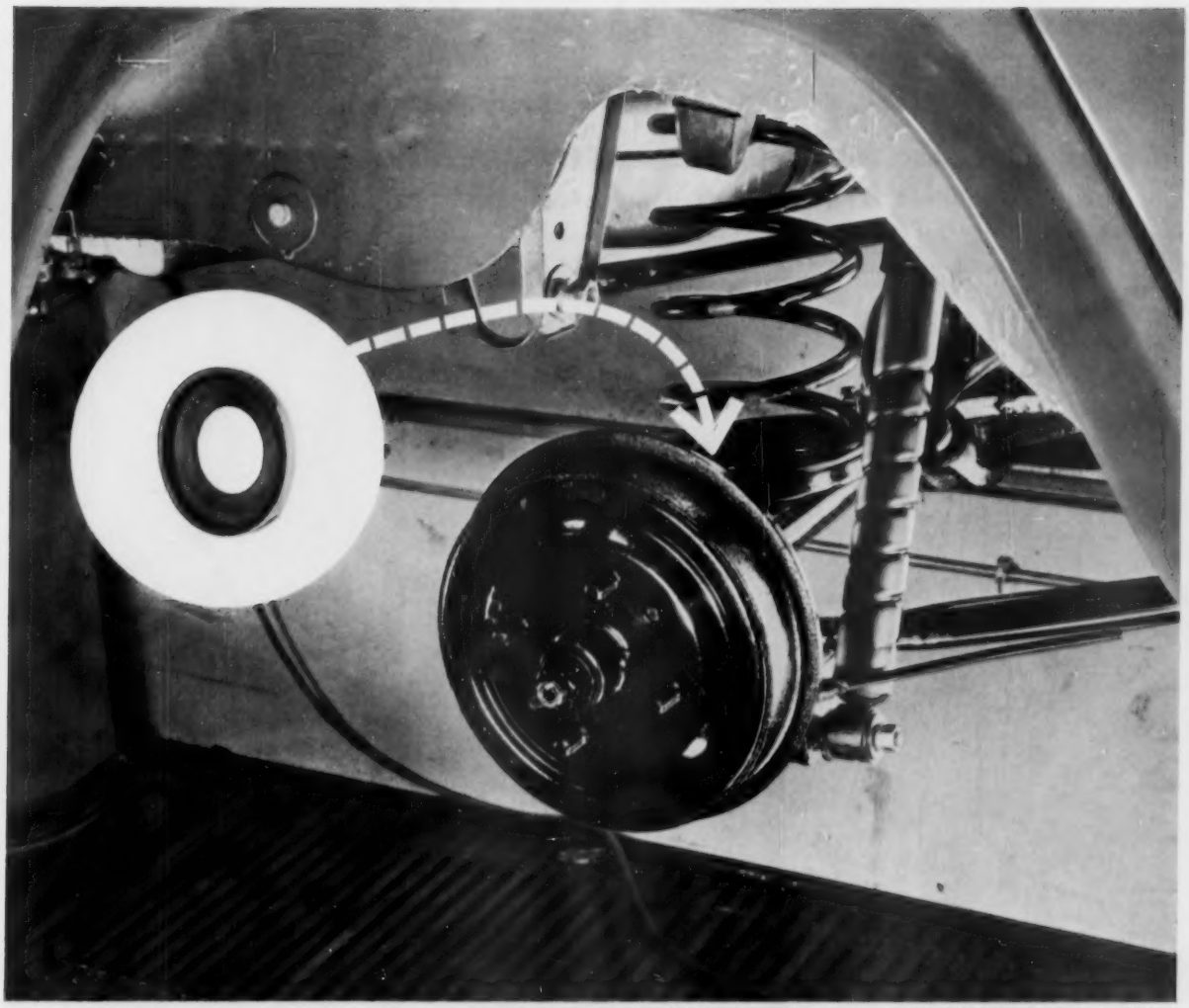

Photo courtesy American Motors Corporation, Detroit, Mich., and Yale Rubber Mfg. Co., Sandusky, Mich.

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If you're interested in making oil seals that will sell, then take two tips from the manufacturer whose product is pictured above. First, develop the simplest design that will do the job. And second, use a compound based on CHEMIGUM nitrile rubber.

CHEMIGUM was chosen for the outer axle shaft seal (shown above) for the following reasons: 1. Outstanding resistance to a range of oils and greases at temperatures up to 250°F. 2. Consistent uniformity. 3. Compatibility with other materials needed. 4. Excellent processability. 5. Physical properties exactly suited to the application.

Through his choice of CHEMIGUM coupled with careful design, this manufacturer has achieved outstanding sealing and performance at reasonable cost – a combination that really sells. How can CHEMIGUM help your ideas become effective realities? Find out by writing for details plus the latest *Tech Book Bulletins* to: Goodyear, Chemical Div., Akron 16, Ohio.

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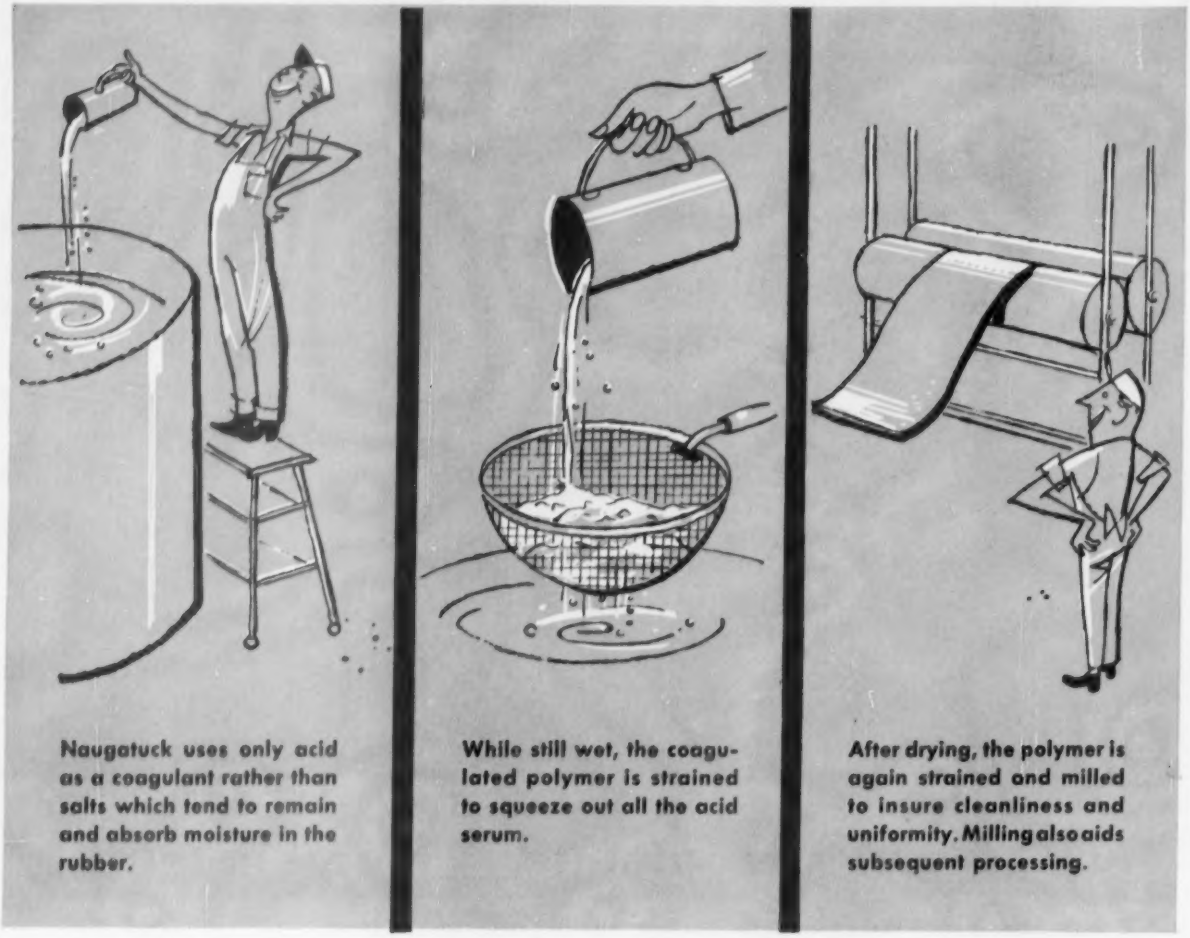

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Rubber Age

Vol. 80, No. 5 FEBRUARY, 1957

# The Compounding of Transparent Rubber

## Part I—Natural Rubber

By RALPH F. WOLF
*Columbia-Southern Chemical Corporation, Barberton, Ohio*

THE fine particle size silica reinforcing pigments which are available today have made possible, for the first time, the production of vulcanized rubber having both excellent transparency and good physical properties. This unusual combination of qualities already is being used to advantage in such items as transparent soles for sport shoes, swim fins, clear tubing, various pharmaceutical items, novelty sidewalls for bicycle tires, printing rubber, transparent pressure-sensitive adhesive masses, and transparent membranes used in vacuum forming of polyester laminates. Natural rubber, some types of GR-S, and nitrile rubbers are all being used in the fabrication of transparent goods.

It is not difficult to make transparent natural rubber compounds without filler but the physical properties of these pure gum stocks are poor. They have had some usage in drug sundries and in "crepe" soling, but applications in the former field have been limited by poor tear resistance and in the latter by lack of stiffness and abrasion resistance and by poor resistance to flow. Transparent pure gum synthetic rubber compounds have such poor physical properties that there are no applications for them at all.

The physical properties of pure gum natural or synthetic rubber stocks can be improved only by adding reinforcing pigments. When rubber is compounded with most fillers, however, transparency is lost even with small additions of pigment and the stock becomes opaque. Reflection and refraction of light by the filler particles mixed into the rubber causes this opacity. The transmission of light through a compound obviously will be decreased by fillers having a different index of refraction from that of the rubber. If this difference is large, reflection and refraction will be great and transmission of light small. Conversely, if the filler has an index of refraction very close to that of the rubber matrix, most of the light will be transmitted instead of reflected and the loaded compound will still be transparent.

Years ago, the only pigment that met this requirement was a special grade of basic magnesium carbonate imported from Japan. Use of this material resulted in properties that were better than those of pure gum stocks but still well below those obtainable with the non-black reinforcing pigments available today.

Transparent magnesium carbonate loaded stocks have another undesirable characteristic. They become white and opaque when stretched. If the stretching is severe, the stock does not recover its transparency when the strain is released. This has been attributed to the orientation of the anisotropic filler particles in the direction of stretch *(1)*. It may also be due to formation of vacules around the relatively large magnesium carbonate particle as the rubber, for which it has little attraction, is pulled away from it.

Certain of the fine particle size silica reinforcing pigments now available have a refractive index very close

SUGGESTED RECIPES FOR TRANSPARENT COMPOUNDS

| Natural Rubber | | Styrene-Butadiene Rubber: Medium Hardness (60-65) | | Styrene-Butadiene Rubber: High Hardness (83-88) | | Nitrile Rubber | |
|---|---|---|---|---|---|---|---|
| Pale Crepe | 100.00 | GR-S 1503 or Krylene NS | 100.00 | Plioflex 1778 | 100.00 | Hycar 1432 | 100.00 |
| Hi-Sil 233 | 39.00 | Hi-Sil 233 | 39.00 | Hi-Sil 233 | 78.00 | Hi-Sil 233 | 39.00 |
| Zinc Oxide | 1.00 | Zinc Oxide | 1.00 | Zinc Oxide | 1.00 | Zinc Oxide | 1.00 |
| Santocure | 1.00 | Zenite | 0.75 | Zenite | 0.90 | TMTDS | 2.75 |
| Methyl Zimate | 0.25 | DPG | 1.50 | DPG | 1.80 | Santocure | 1.50 |
| Hexamine | 1.00 | Hexamine | 1.00 | Hexamine | 1.20 | Stearic Acid | 1.00 |
| Antioxidant 2246 | 2.00 | Diethylene Glycol | 3.00 | Diethylene Glycol | 3.00 | | |
| Sulfur | 1.00 | Sulfur | 1.75 | Sulfur | 1.75 | | |
| Sulfasan R | 1.00 | Stearic Acid | 1.00 | Stearic Acid | 1.00 | | |
| Stearic Acid | 1.00 | | | 100°C. m.p. coumarone resin | 5.00 | | |

to that of natural rubber and some of the synthetics. The physical properties they impart to rubber are very much better than those obtainable with magnesium carbonate. Their particles are spherical in shape and their adhesion to rubber is such that the rubber is not torn away from the pigment surface when the compound is stretched. Consequently, stocks containing these silicas will whiten when extended but regain their transparency when the strain is released.

Foremost among these silica pigments is Hi-Sil 233 which produces the best transparency and highest physical properties at any given volume loading. Judged visually, compounds containing 20 volumes of Hi-Sil X303 appear to be slightly better than those containing Hi-Sil 233. The difference is marginal and is far from being sufficient to justify the use of the much higher cost X303 pigment. Consequently, after a few tests of X303, all subsequent work on transparent compounds was done with Hi-Sil 233. No tests were made with any of the pyrogenic silicas, which are much more expensive even than X303. Cost of pyrogenic silicas is so great that they can not be considered as practical compounding ingredients at the present time.

Vulkasil S-579/1, an experimental silica produced in Germany, has nearly as good transparency as Hi-Sil 233. Another German silica, Ultrasil VN-3, is also good although it has less transparency and lower physical properties than Hi-Sil 233. Vulkasil S and Vulkasil C, predecessors of Vulkasil S-579/1, are much poorer than the new material in transparency. Still lower in the transparency scale are Silteg AS-5, a German sodium aluminum silicate, and Fransil 251, a French silica.

Rather unexpectedly, 20 volume loadings of Hi-Sil 101 produce stocks that at best can only be described as semi-translucent and closely approach being opaque. As would be expected, the silicate pigments Silene EF (calcium silicate) and Zeolex 23 (a silico aluminate) also produce stocks having a low degree of transparency.

The differences in transparency between a number of these pigments when used in natural rubber are clearly shown in Figure 1. The differences are also brought out in Table I which lists the various pigments according to the per cent opacity of cured sheets containing 20 volumes of each. Visual observation of transparency is subjective at best and does not yield a rating which can be recorded for later use. For this reason, the numerical values shown in Table I are considered to be of more value.

This test for measuring per cent opacity of a rubber sheet was conceived by Lawrence J. Smith and is an adaptation of the standard method for measuring opacity of paper. A Hunter Multipurpose Reflectometer was used for making the measurements. Tensile sheets of each compound, 0.075 inch in thickness, were cured between aluminum sheets to insure clean surfaces. Each sheet was placed against a white background and a green Tristimulus filter was employed in obtaining the green light reflectance. Each of the sheets was then placed against a black background and a similar measurement was made. The per cent opacity of the sheet was then calculated by dividing the figure for reflectance against the black background by the figure for reflectance against the white background and multiplying by 100. Obviously, the lower the figure for per cent opacity, the more transparent is the sample measured.

The test is quite reproducible when it comes to putting a series of variables in order time after time although there will be differences in the numerical values obtained. For this reason, a control should be run with each series of tests because results of one series can not necessarily be compared with the results of another series.

TABLE I—COMPARISON OF OPACITY OF NATURAL RUBBER COMPOUNDS CONTAINING VARIOUS SILICA AND SILICATE PIGMENTS

Test Recipe

| | |
|---|---|
| Pale Crepe | 100.00 |
| Pigment (Volumes) | 20.00 |
| Zinc Oxide | 1.00 |
| MBTS | 1.00 |
| Methyl Zimate | 0.25 |
| Hexamethylene Tetramine | 1.00 |
| Antioxidant 2246 | 2.00 |
| Sulfur | 1.00 |
| Sulfasan R | 1.00 |
| Stearic Acid | 1.00 |

Cure: 30′ at 287°F.

| Pigment | Opacity, Per Cent |
|---|---|
| Hi-Sil 233 | 31 |
| Vulkasil S-579/1 | 36 |
| Ultrasil VN-3 | 42 |
| Vulkasil S | 72 |
| Vulkasil C | 72 |
| Silteg AS-5 | 79 |
| Fransil 251 | 82 |
| Hi-Sil 101 | 94 |
| Silene EF | 94 |
| Zeolex 23 | 94 |

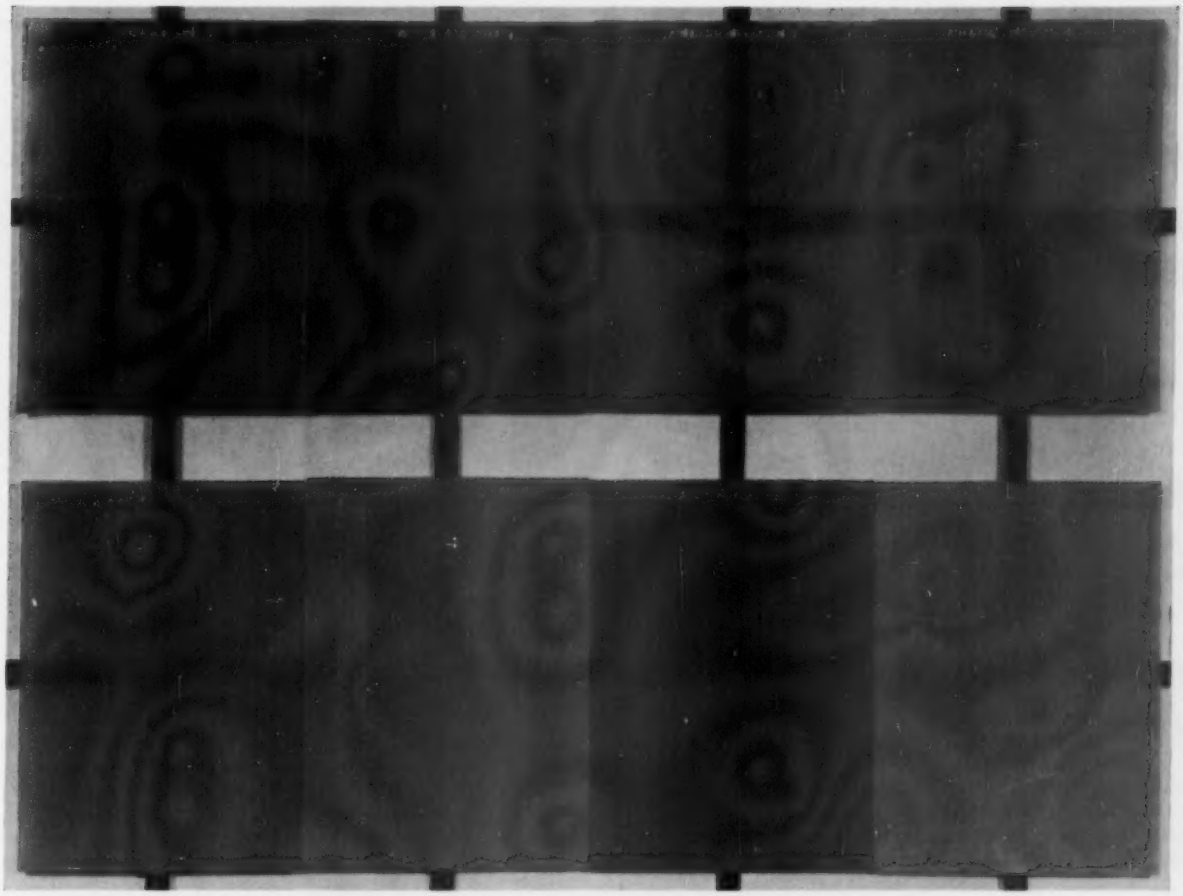

*FIG. 1—A comparison of the transparency of natural rubber compounds containing various silica and silicate pigments. The tensile sheets shown contain 20 volumes of the following pigments: TOP ROW, left to right—Hi-Sil 233, Ultrasil VN3, Vulkasil S, Vulkasil C. BOTTOM ROW, left to right—Silteg AS-5, Hi-Sil 101, Silene EF, Zeolex 23. The test recipe used appears in Table I.*

In order to obtain the highest transparency, as distinguished from mere translucency, it is necessary to take into consideration a number of other factors in addition to the pigment. The zinc oxide must be chosen with care and the amount used held to a minimum. Not every accelerator or antioxidant can be used. These must not discolor and must be free of any tendency to recrystallize in the vulcanized rubber. Softeners and fatty acids must be selected carefully or they will impart a cloudy appearance which will change otherwise transparent stocks to a translucent appearance.

Rules that apply to one kind of elastomer do not necessarily hold for other types. For this reason, the various elastomers that have been studied will be considered separately. Since natural rubber and GR-S type rubbers have greater potential application in compounding of transparent goods, these two elastomers have been given the greatest amount of study. This first part will consider natural rubber only while the second part will discuss the GR-S type rubbers as well as nitrile rubber, butyl rubber and neoprene.

## Type of Rubber and Compounding Ingredients

It seems hardly necessary to say that first quality pale crepe should be used for transparent natural rubber compounds. Transparent compounds can also be made with smoked sheets, but the color of the vulcanizate is so dark that the effect of transparency is lost.

*Vulcanizing Agent:* Elemental sulfur has a bad effect on the transparency of natural rubber and should be kept at a low level. Usually, vulcanized natural rubber compounds will contain 2.5 or 3 parts or even higher amounts of sulfur per 100 parts of rubber. These amounts seriously affect transparency and, until the present time, it has been the practice to reduce sulfur content to 1.5 or 1.75 parts in transparent stocks even though this materially reduces the resulting physical properties. Previously it has not been practical to go lower than 1.5 in elemental sulfur because the resulting vulcanizate would be too poor to be of any value.

In the course of this work attempts were made to replace all of the sulfur with other vulcanization agents but satisfactory results were not obtained. Compounds cured with three parts of Methyl Tuads and no sulfur or two parts of Methyl Tuads and 0.5 part sulfur were opaque. Compounds cured with three parts of Ethyl Selenac were opaque and black. Good transparency was obtained using three parts of VA-7 but tear resistance was poor and the stocks had a characteristic odor which probably would have made them unsuitable for some purposes, such as the soles used on boxed shoes.

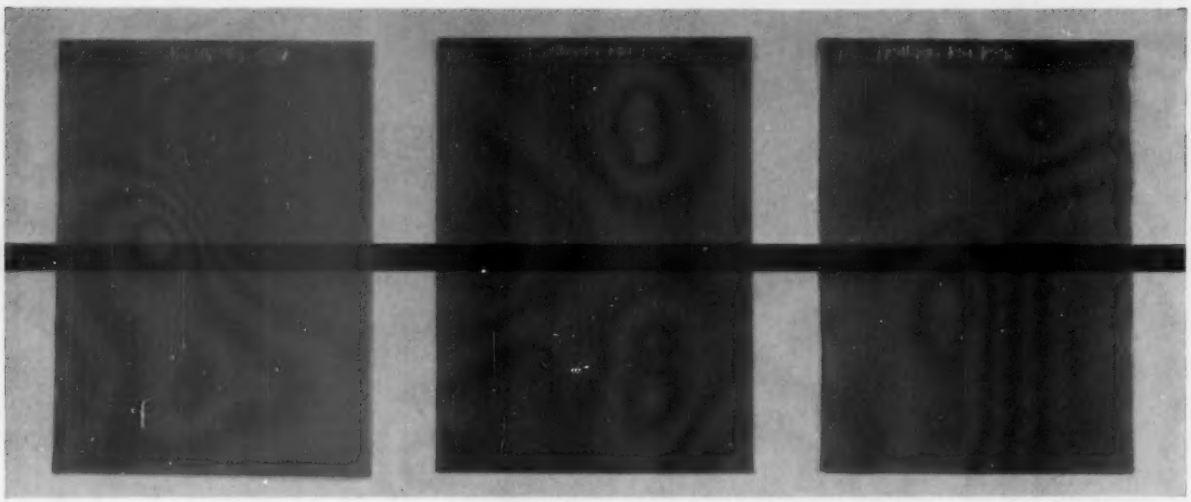

*FIG. 2—A comparison of the effect of sulfur and of sulfur-organic sulfide curing systems on the transparency of natural rubber compounds containing 20 volumes of Hi-Sil 233. From left to right the sheets were vulcanized with 1.75 PHR sulfur, 1 PHR sulfur plus 1 PHR Sulfasan R, and 1 PHR sulfur plus 2 PHR VA-7. The test recipe used appears in Table II.*

Attempts to replace sulfur with oxidizing agents were limited to the use of one material, dicumyl peroxide (Di-Cup). The Di-Cup stocks were lighter in color than sulfur cured stocks and were transparent but the transparency was noticeably less than that of suitably cured sulfur compounds. Physical properties, particularly tear, were also much less than those of suitably cured sulfur compounds.

The problem of reducing elemental sulfur below 1.5 parts to improve transparency and, at the same time, maintaining high physical properties was solved by a new approach. It has been found in this laboratory that by replacing part of the elemental sulfur with certain organic sulfides, it is possible to use as little as 0.75 PHR, or even less, sulfur and obtain improved transparency and much better physical properties than can be obtained with 1.75 PHR of sulfur alone. Comparative transparencies of sulfur and sulfur-organic sulfide cured stocks are shown in Figure 2 and comparative physical properties in Table II. Two suitable organic sulfides are Sulfasan R (4,4′—dithiomorpholine) and VA-7 (an aliphatic polysulfide).

Use of organic sulfides in combination with small amounts of sulfur to produce good transparency and high physical properties simultaneously has not been described previously in the rubber literature. This appears to be one of the more important results obtained in the work on this problem.

Sulfasan R imparts no odor but VA-7, as mentioned above, has a distinctive odor. Consequently, all of the subsequent work on transparent natural rubber compounds was done with combinations of sulfur and Sulfasan R.

Several combinations of Sulfasan R and sulfur were tested and, of these, a combination of one part of each appeared most satisfactory. When the Sulfasan R was held at one part and elemental sulfur reduced to 0.75 there was some loss of tensile, modulus and tear resistance. Loss of tensile was even greater when sulfur was held at one part and the Sulfasan R reduced to 0.75. On the other hand, increase of the Sulfasan R to 1.25 was of no particular benefit.

*Acceleration:* Many different accelerators and accelerator combinations were tested during the course of this work in an effort to determine what acceleration would give the greatest transparency, the lightest color, and the best physical properties.

Choice of acceleration is extremely important in the development of transparent compounds. It is, of course, absolutely necessary that the accelerators be free of any tendency to recrystallize or bloom after cure. Otherwise the vulcanizates will become opaque with the passage of time.

The choice of acceleration is further limited by the necessity of using materials sufficiently active to cure stocks loaded with reinforcing silica which has a high surface area and is very adsorptive. It has been pointed out in earlier publications *(2)* that thiazole-thiuram combinations or thiazole-guanidine combinations activated with triethanol amine are good accelerations for ordinary Hi-Sil compounds. Unfortunately, some of these materials are not the best for transparency or lightness of color where there is no opaque pigment of high covering power to mask a darkening of the rubber.

The most satisfactory combinations found for transparent natural rubber stocks consisted of a thiazole primary accelerator, a small amount of a dithio-carbamate secondary, and an amine activator. Specifically, the preferred combinations consist of Santocure, MBTS, or MBT plus Methyl Zimate, plus hexamethylene tetramine. The results obtained with these three thiazoles in this type of accelerator combination are shown in Table III.

The combination using MBT is generally very slightly lighter and more transparent than those using MBTS or Santocure. This difference is so slight and the physical properties imparted by Santocure are so much better that the Santocure-Methyl Zimate-hexamine combination is, in most cases, going to be first choice.

Other thiazoles tested were not as satisfactory as the three shown in Table III. Zenite, for example, gave as good transparency as MBTS but the physical properties it imparted were somewhat below those of any of the compounds tabulated. Acrin and Ureka C also gave as good transparency as MBTS. Their rates of cure were

slower than that of Zenite although they imparted about the same properties at their optimum the properties again being below those of the compounds in Table III. 2MT gave transparency equal to that of the MBTS stock and was slightly lighter in color, but both modulus and tensile strength definitely suffered.

Neither triethanol amine nor diethylene glycol, which normally are excellent activators for Hi-Sil loaded compounds, are as satisfactory as hexamethylene tetramine for production of transparent stocks. Although use of either of these common activators results in stocks with physical properties just as good as those of the hexamine activated compounds, the transparency is definitely decreased. This point has been checked several times, not only in the Columbia-Southern laboratory, but also by the laboratories of some rubber companies which have not used hexa for many years and wished to avoid reinstating it if possible. In each case it was found to give better results than any other activator in transparent compounds.

TABLE II—COMPARISON OF PHYSICAL PROPERTIES OF TRANSPARENT NATURAL RUBBER COMPOUNDS VULCANIZED WITH SULFUR AND WITH SULFUR-ORGANIC SULFIDE COMBINATIONS

Test Recipe

| | |
|---|---|
| Pale Crepe | 100.00 |
| Hi-Sil 233 (20 volumes) | 39.00 |
| Zinc Oxide | 1.00 |
| MBTS | 1.00 |
| Methyl Zimate | 0.25 |
| Hexamine | 1.00 |
| Antioxidant 2246 | 2.00 |
| Vulcanizing Agents | As Shown |
| Stearic Acid | 1.00 |

| Vulcanizing Agents | Mins. Cure at 287°F. | Modulus 300% | Tensile | Elong. | Duro. A Hard. | Tear (lbs./in.) | Opacity (%) |
|---|---|---|---|---|---|---|---|
| Sulfur 1.75 | 10 | 440 | 2350 | 650 | 53 | 150 | |
| | 15 | 510 | 2630 | 640 | 57 | 150 | |
| | 20 | 520 | 2680 | 630 | 60 | 150 | |
| | 30 | 580 | 2670 | 620 | 61 | 160 | 46.5 |
| | 45 | 540 | 2790 | 640 | 64 | 150 | |
| | 60 | 540 | 2590 | 640 | 63 | 150 | |
| Sulfur 1 | 10 | 620 | 3470 | 670 | 58 | 580 | |
| Sulfasan R 1 | 15 | 690 | 3700 | 650 | 59 | 600 | |
| | 20 | 680 | 3620 | 650 | 60 | 600 | |
| | 30 | 645 | 3530 | 650 | 60 | 510 | 30.5 |
| | 45 | 580 | 3400 | 670 | 61 | 490 | |
| | 60 | 580 | 3240 | 650 | 62 | 510 | |
| Sulfur 1 | 10 | 430 | 2130 | 640 | 52 | 130 | |
| VA-7 2 | 15 | 510 | 2410 | 630 | 55 | 140 | |
| | 20 | 540 | 2490 | 610 | 56 | 150 | |
| | 30 | 600 | 2820 | 630 | 58 | 160 | 39.0 |
| | 45 | 630 | 3010 | 640 | 60 | 150 | |
| | 60 | 560 | 2790 | 640 | 62 | 150 | |
| Oxygen Bomb Aging—5 Days at 158°F. and 300 p.s.i. | | | | | | | |
| Sulfur 1.75 | 20 | 760 | 3190 | 630 | 59 | .... | |
| | 30 | 840 | 3070 | 610 | 61 | .... | |
| Sulfur 1 | 20 | 890 | 3990 | 650 | 61 | .... | |
| Sulfasan R 1 | 30 | 900 | 3840 | 640 | 62 | .... | |
| Sulfur 1 | 20 | 690 | 3090 | 640 | 59 | .... | |
| VA-7 2 | 30 | 780 | 3220 | 620 | 62 | .... | |

TABLE III — COMPARISON OF THREE THIAZOLES IN THIAZOLE-DITHIOCARBAMATE-AMINE ACCELERATION OF TRANSPARENT NATURAL RUBBER COMPOUNDS

Test Recipe

| | |
|---|---|
| Pale Crepe | 100.00 |
| Hi-Sil 233 (20 volumes) | 39.00 |
| Zinc Oxide | 1.00 |
| Thiazole | 1.00 |
| Methyl Zimate | 0.25 |
| Hexamine | 1.00 |
| Antioxidant 2246 | 2.00 |
| Sulfur | 1.00 |
| Sulfasan R | 1.00 |
| Stearic Acid | 1.00 |

| Thiazole | Mins. Cure at 287°F. | Modulus 300% | Tensile | Elong. | Duro. A Hard. | Tear (lbs./in.) | Opacity (%) |
|---|---|---|---|---|---|---|---|
| Santocure | 7½ | 290 | 2270 | 670 | 54 | .... | |
| | 10 | 660 | 3610 | 650 | 59 | 680 | |
| | 15 | 710 | 3740 | 650 | 60 | 670 | |
| | 20 | 650 | 3640 | 660 | 60 | 670 | |
| | 30 | 640 | 3620 | 660 | 61 | 620 | 29.7 |
| | 45 | 540 | 3380 | 690 | 62 | 560 | |
| MBTS | 7½ | 380 | 2140 | 670 | 54 | 400 | |
| | 10 | 630 | 3350 | 650 | 59 | 530 | |
| | 15 | 710 | 3540 | 640 | 60 | 630 | |
| | 20 | 700 | 3520 | 650 | 60 | 620 | |
| | 30 | 680 | 3430 | 650 | 61 | 540 | 29.7 |
| | 45 | 600 | 3220 | 660 | 61 | 520 | |
| MBT | 7½ | 340 | 2070 | 720 | 53 | 315 | |
| | 10 | 560 | 3120 | 650 | 55 | 470 | |
| | 15 | 680 | 3360 | 640 | 59 | 530 | |
| | 20 | 690 | 3370 | 640 | 59 | 470 | |
| | 30 | 670 | 3290 | 640 | 61 | 490 | 29.3 |
| | 45 | 600 | 3110 | 660 | 61 | 310 | |
| Oxygen Bomb Aging—5 Days at 158°F. and 300 p.s.i. | | | | | | | |
| Santocure | 20 | 940 | 4140 | 660 | 63 | .... | |
| | 30 | 870 | 3830 | 650 | 65 | .... | |
| MBTS | 20 | 920 | 4050 | 660 | 63 | .... | |
| | 30 | 860 | 3910 | 660 | 63 | .... | |
| MBT | 20 | 840 | 3900 | 650 | 61 | .... | |
| | 30 | 830 | 3770 | 650 | 62 | .... | |

A word of warning is needed about the type of hexamine employed. This chemical is produced in a coarse grade used in various chemical reactions and in a fine grade used by the rubber and plastics industries. The coarse grade is completely unsatisfactory for rubber compounds because it is very difficult to disperse and its use results in discolored spots in the cured article. On several occasions, reports from rubber goods manufacturers of inability to obtain satisfactory transparency using compounds suggested by the Columbia-Southern laboratory have been traced to the use of a coarse grade of hexamine. Unless an anti-caking agent is used in the finely ground grade of hexamine, the chemical will cake badly in storage and after a short time be of little more value than the coarse grade.

There is available on the market a grade of fine ground hexamine which has proven extremely satisfactory for use in transparent rubber compounds. This grade contains 3 per cent of Silene EF as an anti-caking agent and remains free flowing after many months of storage. It is available from one of the principal suppliers of rubber chemicals.

Thiazole-guanidine-amine cured transparent stocks can be made having as good physical properties as the best thiazole-dithiocarbamate-hexamine cured compound. The former stocks, although transparent, are considerably darker than the latter. The guanidine accelerator is apparently responsible for this darkening. When hexamine is used with MBTS and DPG, the resulting stock is reddish and darker than a corresponding MBTS-Methyl Zimate-hexamine stock. If triethanol amine is used with MBTS-DPG instead of hexamine the resulting compound does not have the reddish tint but it is even darker. This dark color is not improved by substitution of diethylene glycol for the triethanol amine.

If darkening is not objectionable, as it might not be in colored transparent stocks, a combination of 0.75 PHR of MBTS with 1.2 PHR of DPG and 0.25 PHR of triethanol amine can be recommended for a 20 volume Hi-Sil 233 loaded stock vulcanized with 1 PHR each of sulfur and Sulfasan R.

Another accelerator combination giving as good physical properties as the best thiazole-dithiocarbamate-hexamine stocks consisted of 1.25 PHR of Tetrone A plus 1 PHR of hexamine and 1 PHR of diethylene glycol. The Tetrone A-hexa-glycol combination also had almost, but not quite, as good transparency, but since it is more expensive acceleration it can not be given equal preference. It was interesting to note that omission of the hexa as an activator for the Tetrone A not only slowed the rate of cure but reduced the transparency of sheets at the same curing times.

Thionex, an accelerator which has been recommended in the literature for transparent stocks *(3)*, does not appear to be particularly good with Hi-Sil 233 loadings. Used at the 1 PHR level, it gave relatively poor physical properties and transparency either with sulfur alone or with sulfur-Sulfasan R combinations. Addition of activators commonly used with Hi-Sil 233, such as diethylene glycol or triethanol amine, raised the physical properties considerably but not up to the point reached by many of the thiazole-dithiocarbamate-hexamine compounds.

*Antioxidants:* The choice of antioxidant used in transparent natural rubber compounds is as important as that of the accelerators and for the same reasons. The antioxidant must be non-discoloring and must not bloom or it will destroy transparency.

Twelve well known non-staining antioxidants were put through a preliminary screening to determine what effect they had on transparency and color. Four of the materials failed to pass this screening. Agerite White gave a dark brown stock that was almost opaque. Flectol H gave a red stock that was similarly opaque. Agerite Alba and Stabilite Alba gave stocks that were transparent but very dark and for this reason unsatisfactory.

Seven materials that did not affect color or transparency in any way were Agerite Gel, Agerite Stalite, Aminox, Antioxidant 2246, Antox, Deenax, and Ionol. Santowhite Powder was light in color but caused a very slight haziness.

The latter eight materials were then recompounded to check color and transparency and tested for resistance to aging. The results are shown in Table IV. Stocks containing Antioxidant 2246 had the best physical properties after either air oven or oxygen bomb aging. This is the reason for use of this antioxidant in the natural rubber compound included in the suggested "best" recipes.

None of the antioxidants tested prevent the "frosting" of transparent natural rubber stocks after outdoor exposure to sunlight. Frosting is often confused with bloom but results from an entirely different cause. Bloom appears when some component of a rubber compound migrates to the surface. According to Raymond P. Allen *(4)*, frosting occurs when any rubber surface under strain, such as the surface of a molded item, encounters atmospheric ozone or light and relieves itself by cracking. At the edges of these small cracks, small tentacles of rubber and exposed pigment particles appear. These reflect light. Thus, what has been essentially the smooth surface of rubber reflecting light without diffusion has become a roughened, granular surface which reflects diffused light in these cracked areas. Because of this grey appearance, the rubber is said to have "frosted".

Frosting may not be noticed on the surface of opaque goods but it is unavoidably noticeable on the surface of transparent goods. It can be prevented by any protective film which excludes ozone from contact with the rubber. Surfaces which have been varnished or lacquered do not frost and this sort of protection could be provided for goods while they are in warehouse stock. Certain types of waxes which bloom to the surface are helpful in preventing frosting. In the case of transparent goods, however, this remedy would be as bad as the disease, because the blooming wax would destroy transparency as effectively as the frosting.

It is possible that wiping the cured transparent surface with a white mineral oil or other non-volatile liquid having the same refractive index as rubber might be helpful. This might have the effect of helping reduce surface strain and if cracks did form the liquid might fill them and prevent light diffusion. This idea has not been tested.

In connection with the problem of frosting, a test was made of three materials classed as ultraviolet absorbers. These were Uvinul 400, Uvinul 490 and U. V. Absorber 9. Transparency of the three stocks was good but the two Uvinuls imparted a brown color. U. V. Absorber 9 did not affect color noticeably. None of the materials were effective against frosting.

*Zinc Oxide:* Seven domestic zinc oxides were tested in a compound containing 20 volumes of Hi-Sil 233. All of these were fine particle zinc oxides in order that maximum activity could be obtained from a minimum amount of material. This is necessary in working with transparent stocks because all zinc oxides have considerable covering power and no more should be used than is absolutely necessary.

The seven materials tested were Kadox XX72, Kadox 15, St. Joe 20, St. Joe 20-21, AZO ZZZ66, Azodox 55 and Azodox 55TT. No difference could be noted in the transparency of any of the resulting stocks and very little difference in ultimate physical properties. There were some differences in rates of cure. Since this may be of interest to compounders, the results obtained with these seven zinc oxides are shown in Table V.

Vulco, a Japanese zinc oxide highly recommended for transparent compounds, was tested later in a recipe containing 20 volumes of Hi-Sil 233. It was found to be no better than the domestic materials either in transparency or in physical properties imparted to the compound.

Extra light calcined magnesium oxide was tested as a substitute for zinc oxide. The resulting compound was not as transparent as those cured with zinc oxide and the physical properties were distinctly poorer. Opacity increased as the magnesium oxide was increased to three parts and, although the rate of cure was increased, the ultimate properties attained were not improved.

## Table IV—Comparison of Antioxidants in Transparent Natural Rubber Compound

### Test Recipe

| | |
|---|---|
| Pale Crepe | 100.00 |
| Hi-Sil 233 (20 volumes) | 39.00 |
| Zinc Oxide | 1.00 |
| MBT | 1.00 |
| Methyl Zimate | 0.25 |
| Hexamine | 1.00 |
| Antioxidant | 2.00 |
| Sulfur | 1.00 |
| Sulfasan R | 1.00 |
| Stearic Acid | 1.00 |

| Anti-Oxidant | Mins. Cure at 287°F. | Modulus 300% | Tensile | Elong. | Duro. A Hard. | Tear (lbs./in.) |
|---|---|---|---|---|---|---|
| 2246 | 7½ | 510 | 2880 | 580 | 50 | 200 |
| | 10 | 680 | 3630 | 660 | 53 | 510 |
| | 15 | 650 | 3550 | 670 | 54 | 590 |
| | 20 | 640 | 3480 | 680 | 56 | 630 |
| | 30 | 570 | 3420 | 680 | 54 | 590 |
| | 45 | 550 | 3240 | 700 | 57 | 570 |
| Aminox | 7½ | 500 | 3110 | 660 | 50 | 500 |
| | 10 | 670 | 3770 | 660 | 54 | 650 |
| | 15 | 680 | 3950 | 680 | 56 | 680 |
| | 20 | 660 | 3800 | 670 | 56 | 570 |
| | 30 | 610 | 3620 | 660 | 55 | 600 |
| | 45 | 550 | 3310 | 680 | 56 | 620 |
| Antox | 7½ | 710 | 3630 | 630 | 54 | 610 |
| | 10 | 740 | 3870 | 640 | 56 | 680 |
| | 15 | 750 | 3800 | 640 | 57 | 680 |
| | 20 | 680 | 3740 | 640 | 55 | 660 |
| | 30 | 670 | 3570 | 640 | 55 | 640 |
| | 45 | 530 | 3220 | 660 | 55 | 530 |
| Agerite Gel | 7½ | 480 | 2850 | 660 | 51 | 190 |
| | 10 | 570 | 3400 | 680 | 56 | 570 |
| | 15 | 680 | 3740 | 660 | 56 | 710 |
| | 20 | 640 | 3540 | 650 | 56 | 680 |
| | 30 | 610 | 3550 | 670 | 56 | 560 |
| | 45 | 610 | 3380 | 670 | 57 | 550 |
| Agerite Stalite | 7½ | 470 | 2580 | 640 | 50 | 240 |
| | 10 | 630 | 3500 | 650 | 53 | 620 |
| | 15 | 780 | 3830 | 640 | 56 | 670 |
| | 20 | 700 | 3470 | 640 | 57 | 590 |
| | 30 | 640 | 3460 | 650 | 56 | 610 |
| | 45 | 580 | 3210 | 660 | 56 | 510 |
| Deenax | 7½ | 530 | 2820 | 660 | 51 | 180 |
| | 10 | 610 | 3280 | 670 | 56 | 220 |
| | 15 | 690 | 3360 | 630 | 56 | 550 |
| | 20 | 620 | 3380 | 640 | 57 | 480 |
| | 30 | 620 | 3270 | 630 | 56 | 280 |
| | 45 | 560 | 3180 | 670 | 60 | 260 |
| Ionol | 7½ | 310 | 1780 | 680 | 49 | 100 |
| | 10 | 500 | 2990 | 690 | 52 | 190 |
| | 15 | 630 | 3360 | 680 | 56 | 550 |
| | 20 | 600 | 3400 | 680 | 56 | 550 |
| | 30 | 550 | 3320 | 680 | 56 | 430 |
| | 45 | 570 | 3300 | 680 | 58 | 320 |
| Santowhite Powder | 7½ | 300 | 2230 | 690 | 51 | 130 |
| | 10 | 520 | 3180 | 680 | 52 | 220 |
| | 15 | 610 | 3380 | 650 | 53 | 560 |
| | 20 | 630 | 3430 | 670 | 57 | 590 |
| | 30 | 580 | 3400 | 660 | 59 | 550 |
| | 45 | 560 | 3370 | 680 | 58 | 400 |

| Anti-Oxidant | Mins. Cure at 287°F. | Modulus 300% | Tensile | Elong. | Duro. A Hard. | Tear (lbs./in.) |
|---|---|---|---|---|---|---|
| Air Oven Aging—14 Days at 158°F. | | | | | | |
| 2246 | 10 | 1010 | 3930 | 620 | 60 | ... |
| | 20 | 1030 | 4120 | 630 | 66 | ... |
| Aminox | 10 | 860 | 3190 | 620 | 60 | ... |
| | 20 | 1000 | 3610 | 620 | 63 | ... |
| Antox | 10 | 980 | 3330 | 600 | 60 | ... |
| | 20 | 1050 | 3370 | 580 | 62 | ... |
| Agerite Gel | 10 | 880 | 2870 | 600 | 60 | ... |
| | 20 | 1070 | 3310 | 590 | 63 | ... |
| Agerite Stalite | 10 | 940 | 2900 | 600 | 56 | ... |
| | 20 | 1080 | 3250 | 580 | 63 | ... |
| Deenax | 10 | 800 | 1950 | 540 | 56 | ... |
| | 20 | 1120 | 2600 | 530 | 64 | ... |
| Ionol | 10 | 750 | 2060 | 570 | 53 | ... |
| | 20 | 920 | 2710 | 580 | 56 | ... |
| Santowhite Powder | 10 | 490 | 1610 | 620 | 50 | ... |
| | 20 | 710 | 2360 | 630 | 56 | ... |
| Oxygen Bomb Aging—5 Days at 158°F. and 300 p.s.i. | | | | | | |
| 2246 | 10 | 810 | 3300 | 650 | 56 | ... |
| | 20 | 880 | 3540 | 640 | 61 | ... |
| Aminox | 10 | 760 | 2940 | 650 | 59 | ... |
| | 20 | 780 | 3070 | 640 | 63 | ... |
| Antox | 10 | 690 | 2370 | 630 | 55 | ... |
| | 20 | 730 | 2600 | 620 | 56 | ... |
| Agerite Gel | 10 | 530 | 2180 | 660 | 51 | ... |
| | 20 | 670 | 2470 | 630 | 55 | ... |
| Agerite Stalite | 10 | 700 | 2240 | 600 | 54 | ... |
| | 20 | 770 | 2480 | 600 | 59 | ... |
| Deenax | 10 | 660 | 2260 | 620 | 54 | ... |
| | 20 | 770 | 3010 | 660 | 58 | ... |
| Ionol | 10 | 530 | 2130 | 650 | 50 | ... |
| | 20 | 620 | 2420 | 640 | 55 | ... |
| Santowhite Powder | 10 | 380 | 1350 | 620 | 45 | ... |
| | 20 | 500 | 1600 | 610 | 51 | ... |

TABLE V—COMPARISON OF SEVEN ZINC OXIDES IN TRANSPARENT NATURAL RUBBER COMPOUND

Test Recipe

| | |
|---|---|
| Pale Crepe | 100.00 |
| Hi-Sil 233 (20 volumes) | 39.00 |
| Zinc Oxide | 1.00 |
| Santocure | 1.00 |
| Methyl Zimate | 0.25 |
| Hexamine | 1.00 |
| Sulfur | 1.00 |
| Sulfasan R | 1.00 |
| Stearic Acid | 1.00 |

| Zinc Oxide | Mins. Cure at 287°F. | Modulus 300% | Tensile | Elong. | Duro. A Hard. |
|---|---|---|---|---|---|
| Kadox 15 | 7½ | 160 | 1510 | 780 | 51 |
| | 10 | 500 | 3250 | 680 | 51 |
| | 15 | 640 | 3610 | 650 | 64 |
| | 20 | 630 | 3540 | 650 | 64 |
| | 30 | 640 | 3420 | 640 | 65 |
| | 45 | 610 | 3370 | 660 | 68 |
| Kadox XX72 | 7½ | 120 | 1180 | 810 | 51 |
| | 10 | 500 | 3120 | 690 | 56 |
| | 15 | 680 | 3660 | 650 | 60 |
| | 20 | 700 | 3690 | 650 | 62 |
| | 30 | 680 | 3710 | 660 | 64 |
| | 45 | 640 | 3710 | 680 | 64 |
| St. Joe 20 | 7½ | 190 | 1250 | 760 | 51 |
| | 10 | 430 | 2810 | 690 | 55 |
| | 15 | 670 | 3620 | 650 | 60 |
| | 20 | 730 | 3870 | 650 | 62 |
| | 30 | 690 | 3630 | 640 | 63 |
| | 45 | 670 | 3740 | 670 | 64 |
| St. Joe 20-21 | 7½ | 200 | 1080 | 720 | 50 |
| | 10 | 440 | 2730 | 710 | 55 |
| | 15 | 690 | 3590 | 650 | 60 |
| | 20 | 720 | 3630 | 650 | 61 |
| | 30 | 730 | 3690 | 660 | 63 |
| | 45 | 700 | 3530 | 650 | 64 |
| Azo ZZZ66 | 7½ | 230 | 1440 | 750 | 51 |
| | 10 | 520 | 3000 | 670 | 57 |
| | 15 | 720 | 3620 | 640 | 61 |
| | 20 | 750 | 3800 | 650 | 62 |
| | 30 | 760 | 3700 | 630 | 62 |
| | 45 | 740 | 3870 | 660 | 63 |
| Azodox 55 | 7½ | 170 | 1100 | 760 | 52 |
| | 10 | 400 | 2940 | 720 | 57 |
| | 15 | 670 | 3600 | 660 | 61 |
| | 20 | 690 | 3740 | 660 | 61 |
| | 30 | 710 | 3670 | 650 | 62 |
| | 45 | 680 | 3460 | 640 | 61 |
| Azodox 55TT | 7½ | 220 | 1610 | 760 | 54 |
| | 10 | 520 | 3310 | 680 | 60 |
| | 15 | 690 | 3590 | 660 | 63 |
| | 20 | 680 | 3540 | 650 | 64 |
| | 30 | 660 | 3620 | 650 | 65 |
| | 45 | 660 | 3550 | 660 | 64 |

An attempt was also made to use zinc carbonate as an activator in place of zinc oxide. The particular material used could not be dispersed either as a dry pigment or as a masterbatch and the resulting cured sheets had a dusty, hazy appearance. Physical properties of stocks containing one, two, three or six parts of the carbonate were poorer than those containing 1 PHR of zinc oxide. Some work was also done with zinc stearate and this will be discussed in the section dealing with fatty acids.

*Fatty Acids:* Considerable leeway is permissible in the type of fatty acid used for activating transparent compounds. During the course of this work, comparisons were made between five common fatty acids—stearic, lauric, oleic, palm oil, and cottonseed. All gave excellent transparency.

The use of palm oil resulted in somewhat poorer physical properties but, with this exception, there was little to choose between the others. Stearic and lauric gave slightly better properties than the cottonseed fatty acid which was slightly better than oleic. Cottonseed fatty acid gave very slightly better transparency than stearic, lauric or oleic. The compounder can base his choice of which of the four to use on cost and convenience.

During the early work with thiazole-dithiocarbamate-hexamine curing combinations when 1.75 PHR sulfur was being used, experiments were made in which the 1 PHR of zinc oxide and the 1 PHR of stearic acid were replaced with 3.1 and 6.3 PHR of zinc stearate. Physical properties equal to the control were obtained with the lesser amount of zinc stearate but the transparency was much poorer. The larger amount of stearate gave much better physical properties than the control, particularly in respect to tear resistance, but transparency suffered even more. Replacement of the MBTS accelerator with a zinc salt of MBT (Zenite) in the stock containing 3.1 PHR of zinc stearate did not improve the transparency and resulted in somewhat poorer physical properties.

The substitution of zinc stearate for stearic acid and

TABLE VI—COMPARISON OF ZINC OXIDE AND STEARIC ACID WITH FATTY ACID SALTS OF ZINC IN TRANSPARENT NATURAL RUBBER

Test Recipe

| | |
|---|---|
| Pale Crepe | 100.00 |
| Hi-Sil 233 (20 volumes) | 39.00 |
| MBTS | 1.00 |
| Methyl Zimate | 0.25 |
| Hexamine | 1.00 |
| Sulfur | 1.00 |
| Sulfasan R | 1.00 |
| Activation | As Shown |

| Activation | Mins. Cure at 287°F. | Modulus 300% | Tensile | Elong. | Duro. A Hard. | Tear (lbs./in.) | |
|---|---|---|---|---|---|---|---|
| Zinc Oxide 1... | 7½ | 660 | 3610 | 650 | 59 | 630 | Transparent |
| Stearic Acid 1.. | 10 | 630 | 3600 | 650 | 60 | 630 | Transparent |
| | 15 | 650 | 3520 | 640 | 61 | 650 | Translucent |
| | 20 | 630 | 3430 | 660 | 61 | 610 | Translucent |
| | 30 | 550 | 3300 | 670 | 61 | 530 | |
| | 45 | 540 | 3160 | 670 | 61 | 530 | |
| Zinc Stearate 2.. | 10 | 430 | 2590 | 660 | 57 | 180 | |
| | 15 | 480 | 2790 | 670 | 59 | 210 | |
| | 20 | 400 | 2390 | 660 | 58 | 180 | |
| | 30 | 350 | 2370 | 700 | 58 | 170 | |
| | 45 | 330 | 2160 | 700 | 60 | 160 | |
| Zinc Stearate 4.. | 10 | 410 | 2890 | 680 | 57 | 440 | |
| | 15 | 440 | 3090 | 690 | 58 | 550 | |
| | 20 | 400 | 2760 | 700 | 58 | 520 | |
| | 30 | 340 | 2720 | 720 | 57 | 460 | |
| | 45 | 340 | 2560 | 710 | 58 | 370 | |
| Zinc Laurate 2.. | 10 | 290 | 2070 | 690 | 47 | 140 | |
| | 15 | 450 | 2910 | 660 | 50 | 430 | |
| | 20 | 440 | 2860 | 680 | 53 | 450 | |
| | 30 | 380 | 2640 | 700 | 53 | 420 | |
| | 45 | 350 | 2500 | 710 | 52 | 280 | |

zinc oxide was attempted again after the sulfur-Sulfasan R combination was developed to replace 1.75 PHR of sulfur alone. Reduction of the stearate to 2 PHR resulted in transparency equal to that of the control but physical properties suffered very badly. Increasing the stearate to 4 PHR improved physical properties but caused a noticeable loss of transparency.

Zinc laurate was also tested as a replacement for zinc oxide and stearic acid. At the 2 PHR level it was much less transparent than the control and had poorer physical properties.

From these results, shown in Table VI, it was concluded that use of fatty acid salts of zinc is less desirable than use of zinc oxide and a fatty acid.

## Comparison of Pigments

It was mentioned in the introduction to this article that Hi-Sil 233, Hi-Sil X303, Vulkasil S-579/1 and Ultrasil VN—3 were the only four pigments that needed to be given consideration for use in transparent natural rubber compounds. The pyrogenic silicas are not practical materials from the cost standpoint and other silicas and silicates do not give sufficient transparency, as is shown in Table I.

Hi-Sil X303 is marginally better than Hi-Sil 233 in transparency and gives better physical properties as Table VII shows. In most cases, however, the advantages will not justify use of the more expensive X303. Judging from the transparency rating in Table I and the comparative physical properties shown in Table VII there is little question about Hi-Sil 233 being the next most desirable silica to use after X303.

The German silica, Vulkasil S-579/1, has a much higher surface area than either Hi-Sil 233 or Ultrasil VN—3. The former has a B.E.T. area of 400 square meters per gram while both of the latter have areas in the 150 to 160 range. When Vulkasil S-579/1 is used in a recipe such as VII-A, this high surface area affects cure so that one does not obtain the physical properties which are potentially available. Consequently, it was run in a second recipe (VII-B) which contained enough diethylene glycol to overcome the greater absorption resulting from the higher surface area.

When this was done it was found that the new grade of Vulkasil imparted physical properties quite similar to those obtained with Hi-Sil 233 and Ultrasil. The test recipe obviously contains more glycol than necessary because the Vulkasil stock is now overcured. Probably an amount of glycol in the range of three parts would be sufficient.

For the sake of comparison, results obtained with Hi-Sil 233 in the glycol-containing recipe are also shown in Table VII. Ultimate tensile strength and tear resistance were higher than those obtained in the glycol-free recipe. This Hi-Sil compound obviously is overcured also.

It was stated earlier that the transparency of natural rubber compounds is decreased somewhat by diethylene glycol. Therefore, use of recipe VII-A rather than VII-B is recommended when Hi-Sil 233 is employed as the reinforcing pigment even though the latter recipe results in higher tensile properties.

## Varied Hi-Sil 233 Loadings

As much as 40 volumes of Hi-Sil 233 can be loaded into natural rubber without much loss of transparency if acceleration is adjusted to give good cure at the higher loadings.

In an early set of experiments, 10, 20, 30 and 40 vol-

TABLE VII—COMPARISON OF FOUR SILICA PIGMENTS IN TRANSPARENT NATURAL RUBBER COMPOUNDS

Test Recipes

| | VII-A | VII-B |
|---|---|---|
| Pale Crepe | 100.00 | 100.00 |
| Reinforcing Silica (20 vols.) | 39.00 | 39.00 |
| Zinc Oxide | 1.00 | 1.00 |
| MBTS | 1.00 | 1.00 |
| Methyl Zimate | 0.25 | 0.25 |
| Hexamine | 1.00 | 1.00 |
| Antioxidant 2246 | 2.00 | 2.00 |
| Sulfur | 1.00 | 1.00 |
| Sulfasan R | 1.00 | 1.00 |
| Stearic Acid | 1.00 | 1.00 |
| Diethylene Glycol | — | 5.00 |

| Test Recipe | Silica | Mins. Cure at 287°F. | Mod. 300% | Tensile | Elong. | Duro. A Hard. | Tear (lbs./in.) |
|---|---|---|---|---|---|---|---|
| VII-A | Hi-Sil 233 | 10 | 770 | 3900 | 650 | 56 | 710 |
| | | 15 | 980 | 4140 | 630 | 62 | 640 |
| | | 20 | 930 | 3970 | 630 | 61 | 640 |
| | | 30 | 860 | 3830 | 640 | 62 | 640 |
| | | 45 | 800 | 3590 | 630 | 61 | 610 |
| | | 60 | 740 | 3340 | 640 | 61 | 500 |
| VII-A | Hi-Sil X303 | 10 | 540 | 3870 | 710 | 60 | 720 |
| | | 15 | 750 | 4340 | 680 | 68 | 830 |
| | | 20 | 710 | 4340 | 700 | 69 | 790 |
| | | 30 | 660 | 4080 | 710 | 70 | 680 |
| | | 45 | 610 | 3730 | 710 | 70 | 640 |
| | | 60 | 530 | 3480 | 720 | 70 | 570 |
| VII-A | Ultrasil VN—3 | 10 | 560 | 2950 | 640 | 65 | 190 |
| | | 15 | 740 | 3500 | 630 | 68 | 210 |
| | | 20 | 710 | 3280 | 630 | 69 | 200 |
| | | 30 | 680 | 3120 | 640 | 70 | 180 |
| | | 45 | 630 | 3070 | 620 | 70 | 170 |
| | | 60 | 590 | 3020 | 680 | 70 | 160 |
| VII-A | Vulkasil S-579/1 | 10 | 330 | 2330 | 700 | 56 | 130 |
| | | 15 | 430 | 2560 | 650 | 60 | 160 |
| | | 20 | 440 | 2660 | 660 | 61 | 160 |
| | | 30 | 420 | 2660 | 680 | 62 | 170 |
| | | 45 | 380 | 2660 | 680 | 62 | 160 |
| | | 60 | 370 | 2680 | 720 | 63 | 140 |
| VII-B | Hi-Sil 233 | 10 | 420 | 4850 | 770 | 59 | 830 |
| | | 15 | 410 | 4740 | 780 | 59 | 860 |
| | | 20 | 400 | 4750 | 790 | 59 | 830 |
| | | 30 | 380 | 4160 | 770 | 59 | 650 |
| | | 60 | 300 | 3940 | 800 | 60 | 610 |
| VII-B | Vulkasil S-579/1 | 10 | 330 | 3790 | 760 | 54 | 550 |
| | | 15 | 320 | 3560 | 760 | 55 | 730 |
| | | 20 | 300 | 3480 | 780 | 54 | 670 |
| | | 30 | 300 | 3340 | 760 | 55 | 580 |
| | | 60 | 250 | 2860 | 800 | 55 | 550 |
| Oxygen Bomb Aging—5 Days at 158°F. and 300 p.s.i. | | | | | | | |
| VII-A | Hi-Sil 233 | 20 | 1000 | 4000 | 630 | 57 | — |
| | | 30 | 960 | 3530 | 620 | 56 | — |
| VII-A | Hi-Sil X303 | 20 | 780 | 4000 | 690 | 65 | — |
| | | 30 | 790 | 3790 | 670 | 65 | — |
| VII-A | Ultrasil VN—3 | 20 | 790 | 3460 | 650 | 66 | — |
| | | 30 | 810 | 3250 | 640 | 66 | — |
| VII-A | Vulkasil S-579/1 | 20 | 520 | 2960 | 680 | 65 | — |
| | | 30 | 510 | 3070 | 720 | 66 | — |
| VII-B | Hi-Sil 233 | 20 | 680 | 4440 | 710 | 65 | — |
| | | 30 | 660 | 4250 | 710 | 65 | — |
| VII-B | Vulkasil S-579/1 | 20 | 630 | 3690 | 690 | 64 | — |
| | | 30 | 600 | 3410 | 690 | 65 | — |

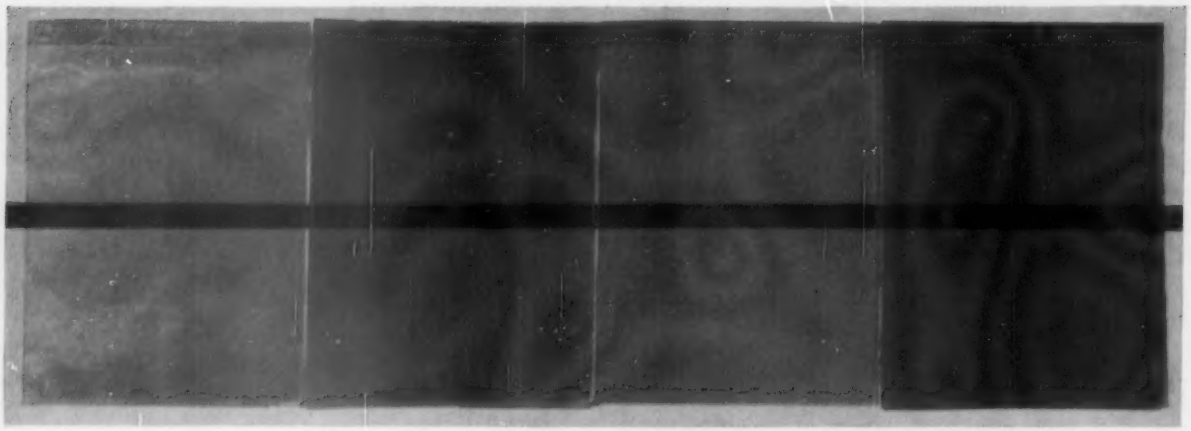

*FIG. 3—A comparison of the effect of various Hi-Sil 233 loadings on the transparency of natural rubber compounds. From left to right the sheets contain 10, 30, 20 and 40 volumes of pigment. The test recipes used appear in Table VIII.*

TABLE VIII—EFFECT OF INCREASED HI-SIL 233 LOADINGS IN TRANSPARENT NATURAL RUBBER COMPOUNDS

| | VIII-A | VIII-B | VIII-C |
|---|---|---|---|
| Pale Crepe | 100.00 | 100.00 | 100.0 |
| Hi-Sil 233 | As Shown | As Shown | As Shown |
| Zinc Oxide | 1.00 | 1.00 | 1.0 |
| Santocure | 1.00 | 1.50 | 2.0 |
| Methyl Zimate | 0.25 | 0.37 | 0.5 |
| Hexamine | 1.00 | 1.50 | 2.0 |
| Antioxidant 2246 | 2.00 | 2.00 | 2.0 |
| Sulfur | 1.00 | 1.00 | 1.0 |
| Sulfasan R | 1.00 | 1.00 | 1.0 |
| Stearic Acid | 1.00 | 1.00 | 1.0 |

| Hi-Sil 233 Loading | Test Recipe | Mins. Cure at 287° F. | Mod. 300% | Tensile | Elong. | Duro. A Hard. | Tear (lbs./in.) | Opacity (%) |
|---|---|---|---|---|---|---|---|---|
| 19.5 PHR (10 vols.) | VIII-A | 10 | 310 | 1590 | 850 | 33 | 300 | |
| | | 15 | 440 | 4200 | 710 | 40 | 420 | |
| | | 20 | 440 | 4160 | 680 | 41 | 410 | 30.7 |
| | | 30 | 410 | 4110 | 690 | 43 | 450 | |
| | | 45 | 320 | 3760 | 720 | 43 | 460 | |
| 39 PHR (20 vols.) | VIII-A | 10 | 540 | 3360 | 690 | 55 | 460 | |
| | | 15 | 650 | 3860 | 680 | 58 | 700 | |
| | | 20 | 680 | 3660 | 660 | 59 | 620 | 31.7 |
| | | 30 | 630 | 3520 | 660 | 60 | 600 | |
| | | 45 | 530 | 3450 | 690 | 62 | 540 | |
| 58.5 PHR (30 vols.) | VIII-B | 10 | 780 | 3500 | 630 | 68 | 410 | |
| | | 15 | 920 | 3550 | 590 | 69 | 590 | |
| | | 20 | 950 | 3610 | 600 | 71 | 650 | 33.8 |
| | | 30 | 870 | 3590 | 620 | 73 | 680 | |
| | | 45 | 830 | 3510 | 630 | 75 | 650 | |
| | | 60 | 820 | 3440 | 630 | 75 | 500 | |
| 78.0 PHR (40 vols.) | VIII-C | 10 | 1500 | 3370 | 540 | 78 | 690 | |
| | | 15 | 1530 | 3440 | 550 | 79 | 690 | |
| | | 20 | 1390 | 3310 | 560 | 79 | 690 | 34.4 |
| | | 30 | 1230 | 3090 | 560 | 82 | 620 | |
| | | 45 | 1170 | 3070 | 570 | 84 | 610 | |
| | | 60 | 1100 | 3120 | 600 | 84 | 550 | |

umes of 233 were loaded into the same base recipe accelerated with a Santocure - dithiocarbamate - hexamine combination. No change in total acceleration was made to compensate for the increased loadings. This obviously is not the normal way to compound. The 10 and 20 volume loaded stocks were very transparent but the compound containing 30 volumes was only semi-transparent and the one containing 40 volumes was no better than translucent.

Transparency of any specific compound depends partly on its state of cure. That is, a sheet made from a potentially transparent compound will not be transparent if it is undercured. As cure is increased the clarity improves until it reaches the maximum obtainable from the particular compound used. Beyond this point, the transparency is not increased with increasing cure.

Because of this, further work was done on the 30 and 40 volume loaded compounds to see if proportional increases of accelerators or of accelerators and sulfur would improve transparency.

Using accelerator combinations known to give good transparency, it was found that if acceleration was increased roughly in proportion to loading, natural rubber sheets having Hi-Sil 233 loadings of 30 and 40 volumes could be made with almost as good transparency as is obtainable at 10 and 20 volume loadings. Increasing sulfur in addition to increasing acceleration tightened up cure but decreased transparency somewhat.

Transparent natural rubber sheets containing 10, 20, 30 and 40 volumes of Hi-Sil 233 are illustrated in Figure 3. As a result of an error by the photographer these are not in the proper order but, from left to right, contain 10, 30, 20 and 40 volumes of pigment, respectively. It will be noted that the sheets containing 20 and 30 volume loadings appear to have about equal transparency and this is born out by the per cent opacity measured by the Reflectometer. The greater amount of accelerator has made the 30 volume loaded stock somewhat darker in color, however, and this is also noticeable in the photograph. Physical properties of the natural rubber compounds at the four different loading levels are given in Table VIII.

## Processing Methods

Processing methods used in the laboratory to mix transparent compounds will definitely affect the transparency

of the cured stock. It is likely that similar effects result from factory scale operations. Some of the processing variations which have a bearing on transparency are mentioned briefly below.

It has been found in the laboratory that natural rubber compounds have better transparency when based on pale crepe that has had a preliminary breakdown than when based on unbroken down rubber.

Banbury mixed compounds have better transparency than mill mixed compounds based on the same recipe.

If the finished batch is cooled and remilled before cure the transparency is somewhat improved, probably because of better dispersion. If the cost of remilling is undesirable, transparency will be improved slightly if the finished batch is simply aged for five days without any remill. In this case, the aging period may bring about better wetting of the pigment.

Although transparency does not seem to be affected by heat encountered in processing, the color of the vulcanized transparent sheets is related directly to the heat history of the compound before cure. A compound which has been mixed as cool as possible, cooled quickly after mixing and not subjected to much heat during stock preparation operations, such as extruding or calendering, will be much lighter in color than a compound which has been mixed at high temperature, and in this and other ways acquired considerable heat history. This is true both of natural and synthetic rubbers. Therefore, mixing and all other processing operations should be done at the lowest possible operating temperature consistent with production demands.

*Temperature of Cure:* A comparison was made between tensile sheets of a transparent compound cured at 270°F. and sheets of the same stock cured at 320°F.

The two sets of sheets were equally transparent, but those cured at 270°F. were slightly lighter in color. The difference in color was not judged great enough to justify long curing times at low temperatures with the consequent tieing up of equipment that would follow.

A brief comparison of properties obtained at the two curing temperatures is given in Table IX. Unfortunately, the shortest curing time chosen in each case was either at or past the optimum. Somewhat better properties probably would have been obtained at 320°F. with a three or four minute cure.

TABLE IX—EFFECT OF CURING TEMPERATURE ON PROPERTIES OF TRANSPARENT NATURAL RUBBER COMPOUND

Test Recipe

| | |
|---|---|
| Pale Crepe | 100.00 |
| Hi-Sil 233 (20 volumes) | 39.00 |
| Zinc Oxide | 1.00 |
| Santocure | 1.00 |
| Methyl Zimate | 0.25 |
| Hexamine | 1.00 |
| Antioxidant 2246 | 2.00 |
| Sulfur | 1.00 |
| Sulfasan R | 1.00 |
| Stearic Acid | 1.00 |

| Cure | Modulus 300% | Tensile | Elong. | Duro. A Hard. | Tear (lbs./in.) |
|---|---|---|---|---|---|
| 30′ x 270°F. | 750 | 4000 | 660 | 60 | 670 |
| 60′ x 270°F. | 690 | 3780 | 660 | 60 | 660 |
| 90′ x 270°F. | 660 | 3520 | 660 | 60 | 560 |
| 5′ x 320°F. | 640 | 3590 | 660 | 58 | 570 |
| 10′ x 320°F. | 600 | 3230 | 660 | 60 | 520 |
| 15′ x 320°F. | 550 | 2970 | 680 | 60 | 440 |

## Colored Transparent Compounds

Transparent compounds can be made in a variety of attractive colors by adding very small amounts of coloring pigments. Not much color is required because it does not have to overcome the covering power of the opaque fillers. Possible applications for the colored transparent stocks are in such things as bath mats, sink and drainboard mats, other household items, swim fins and masks, and molded novelty items in general, as well as in sport shoe soling.

No extended study of colors was made. Sheets were prepared in which three different oil-soluble colors and three different widely used insoluble organic rubber colors were incorporated. Amounts of color in the range of 0.02 to 0.05 per 100 parts of rubber were ample to produce strong shades.

The oil-soluble colors gave the best looking sheets initially. They were light fast, at least after limited exposure, but were not tested for bleeding or crocking. The effect of soap solutions should be checked carefully before oil-soluble colors are used in any sort of housewares.

The regular rubber colors which were used were all non-fading and non-bleeding. They did reduce transparency to some extent but the amounts of color required are so small that loss of transparency was not serious.

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(2) E. M. Allen, F. W. Gage and R. F. Wolf, "Compounding of Natural Rubber with a New Fine Particle Silica," *Rubber Age (N. Y.)*, Vol. 65, pp. 297-303 (1949); also, "Acceleration of Hi-Sil Compounds with Thiazole-Guanidine Combinations," Columbia-Southern Pigment Data Bulletin No. 50-10 (Sept., 1950).

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# Super-Heated Steam Used as Diluent in Butadiene Manufacture

THE Polymer Corporation of Sarnia, Ontario, Canada, was recently faced with the problem of superheating steam for laboratory operations to study the dehydrogenation of butylene and butadiene. The solution was found in a laboratory furnace which was used to help set up equipment for pilot plant studies. The unit was a Hevi-Duty Type 70 multiple unit laboratory furnace, a product of the Hevi-Duty Electric Co. of Milwaukee, Wisconsin. This furnace, which is said to combine sturdy construction and low heat conductivity from shell to base with easy operation and highest grade heating elements, was used to superheat the steam as it passed from the boiler to the process. The laboratory furnace supplements the company's regular Type 70 furnace.

*View of the Western Backing plant at Culver City, Calif., with Fred Oster (left) and Morris Heller (right).*

# How Engineered Cooling Paid Off for the Western Backing & Coating Co.

**By BURT WETHERBEE**

*Engineering Staff, Pasadena Equipment & Supply Co., Pasadena, Calif.*

ONE of the anomalies encountered even in our most modern factories, where heat is an essential or resultant factor of production, is inadequate provision for dissipation of heat from the product during necessary cooling. Western Backing & Coating Company of Culver City, California, an outstanding west coast manufacturer of coated fabrics, has cut production time and improved product quality during the past three years after installation of an adequate cooling system.

Western Backing, which uses natural and synthetic rubbers, vinyls, silicones, and various other coating compounds on many types of fabrics, did not take the hard-to-explain route of so many companies who spend thousands of dollars just on recorder-controllers for precision control of process heat. They chose not to ignore properly engineered cooling nor to make a compromise at the expense of product quality, vital production time and valuable floor space. Instead, they selected a system which will be outlined below.

As shown schematically in Figure 1, the coating compound is metered and spread under an adjustable doctor blade onto the moving fabric which then travels into the

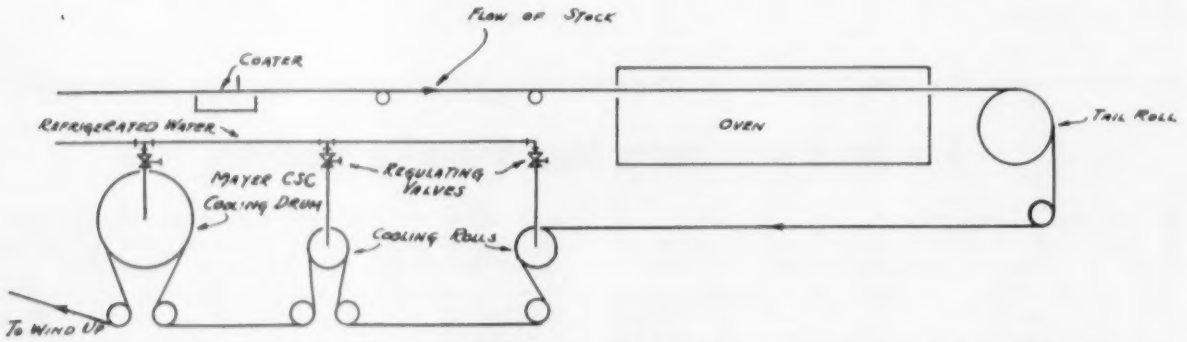


*FIG. 1—Schematic flow chart of the coating process used by Western Backing & Coating Co.*

horizontal oven. This oven is gas-fired, with explosion-proof equipment throughout, since flammable and explosive solvents are a part of most of the coating compounds used. Operating temperatures in the oven are precision controlled either at a uniform level or in gradient, depending on the requirements of the work. The fabric emerges from the oven, travels around the tail roll indicated at the far right, and then in reverse direction comes back either through the oven or through the air space underneath. After passing over the cooling rolls, the fabric is wound upon the drum which provides the tension for the operation. The process is repeated if the reverse of the fabric is to be coated.

In Figure 2, the freshly coated fabric has just passed under the doctor blade and is entering the oven. Underneath is the fabric which has already traveled through the oven and will shortly go on the wind-up after passing over the cooling rolls. These rolls are the closed type (as is the tail roll) with rotary joints and are made from two concentric shells welded at the ends. Stainless steel is preferred, not only for permanence of heat transfer characteristics but for eliminating the formation of rust which would result from the condensation of atmospheric moisture upon these cold surfaces. Although it is not visible in the photograph, a short length of pipe from the rotary joint is welded into the inner shell of the roll and carries the cooling water into the space between the concentric shells.

While these rolls do a good job in cooling the fabric, there is still room for improvement in heat transfer because not only does the cooling water travel from one end to the other, warming up on the way, but a set flow pattern is established.

Although not at present in the cooling train, the cooling drum construction illustrated in Figure 3 represents the best yet devised for this type of cooling operation. The view into one end of the open shell shows the jets mounted in the hollow shaft, spaced according to specific requirements for high heat transfer and uniformity across the entire face of the drum. The coolant, flowing under pressure through a rotary joint in one end of the shaft, is sprayed in fan patterns against the inner surface of the shell. In this manner, not only does the entire area receive the same temperature water but a "scouring action" takes place, if this term can be used.

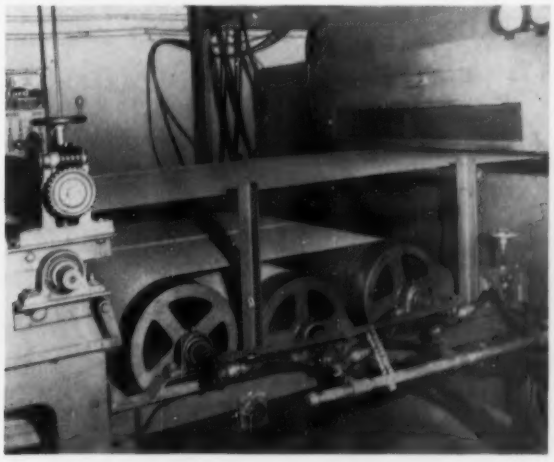

*FIG. 2—After passing under the doctor blade, the coated fabric enters the oven, as seen in this view. Note the cooling rolls.*

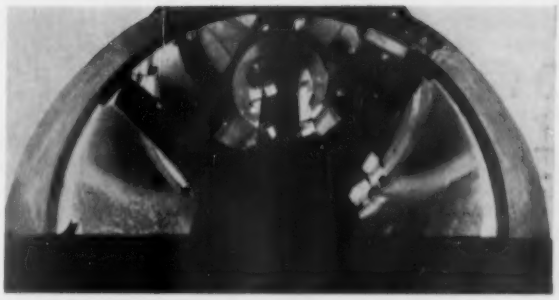

*FIG. 3—Interior construction of the Mayer CSC Cooling Drum. By means of jets, the coolant is sprayed in fan patterns against the inner surface.*

This almost perfect approach to the problem of removing heat uniformly from the entire roll area is especially applicable in embossing operations. The coolant flows out of the shell by gravity into the coolant return line. Stainless steel is used throughout the shell, which is known as a Mayer CSC Cooling Drum.

Prior to the installation of their present cooling system, the management of Western Backing recognized two basic conditions where definite improvements could be made. For product quality, it was necessary to prevent sticking, or picking off, of the coating in its heated condition onto the cooling rolls. For increased production, it was necessary to cool the work more quickly to a temperature lower than the "picking off" point, and to lower the heat from the work substantially to room temperature before the winding-up point.

In Southern California there are, practically speaking, only three sources of cooling water in the large volumes usually required for industrial operations. City or municipal water is not only expensive but its use in a region of scarcity is an affront to conservation; furthermore, average temperatures of available water in this region are too high for any production line cooling. It was on this account that the line speed at Western Backing had to be reduced throughout a large portion of the year to prevent the "picking off" which has been mentioned.

Evaporative cooling (commonly called water tower cooling) is dependent on the wide fluctuations in the wet bulb temperatures. While excellent and inexpensive for high level cooling, its employment in most rubber and plastic manufacturing is actually an expensive expedient.

Mechanically refrigerated, thermostatically controlled, re-circulated water (brine or other medium) through all equipment where process cooling is required represents the best solution, as proved in many rubber and plastics plants. Where such an unvarying source can be drawn upon, it is possible to obtain pinpoint temperature control of individual pieces of equipment by the mere adjustment of a hand valve to increase or decrease the flow of the coolant.

Engineering of the installation and manufacturing of the equipment was performed by Mayer Refrigerating Engineers, specialists in the application of process and spot cooling to rubber and plastics manufacturing. The heart of the installation is the Chil-Er (Figure 4), a package unit containing the refrigeration and pumping equipment, thermostatic and safety controls and dynamically balanced for vibration-free performance. The Chil-Er was skidded into place outside the wall of the coating department and required only that the power and piping lines be brought to it before starting operation. By locating the unit outside the coating department

the necessity of furnishing expensive explosion-proof controls and motors was eliminated. The cost of the extra 20 feet of double piping required was negligible.

The Chil-Er model of the required size delivers cooling water out of its own pumping system and storage tank up to 45 gallons per minute at a pressure of 35 pounds per square inch, thermostatically controlled to 2°F. A by-pass valve located on the pressure side of the pump internally in the unit makes it possible to valve down the coolant flow at the production equipment to zero, or open up to the full rated flow, in this case, 45 gallons per minute. That portion of the total capacity not required is automatically re-circulated within the Chil-Er itself, contributing to fast start-up of production equipment. The coolant is brought from a warm start down to the thermostatic setting in a matter of minutes; further, the operating efficiency is increased. The capacity of this installation at 45°F. coolant delivery is 60,000 BTU-hr.

From the main supply line of refrigerated water, individual lines run in parallel to the rolls. Equipped with hand valves before each roll, the system provides a simple but very effective means of controlling the coolant flow through each roll, with the result that the temperature of each roll can be adjusted and quite accurately maintained. The coolant, after passing through the equipment, exits into a three-inch return line and flows by gravity back to the Chil-Er, where it is again cooled to the thermostatic setting.

Initial calculations of the heaviest production load on the system had indicated that 45°F. should be available; other types of production runs were less demanding and it would be satisfactory to run the Chil-Er at a higher temperature. In practice, however, it has been found much simpler to have available, at all times, a constant source of 45° coolant, and meet any changing requirements on the equipment by the valving operation already referred to.

It should be mentioned that the over-all efficiency of this installation is especially high because the management scrupulously followed the best practices in completely insulating all lines and fittings.

After three years of 16- and 24-hour day operation, executives of the company are gratified most of all by the high level of product uniformity attainable with exact control of cooling. Previous losses resulting from substandard or reject material have been drastically reduced. The increase in production on the same equipment and the same working schedule has amounted to 25%. Considering these gains in quality and productivity, it is easily understood how this investment paid for itself completely in a very few months.

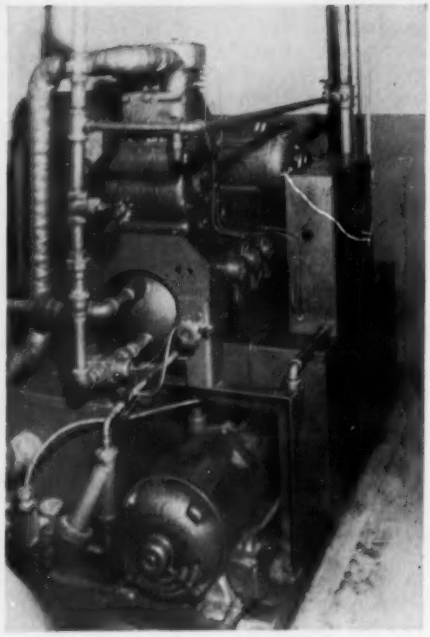

*FIG. 4—The heart of the Western Backing cooling system is this Mayer Chil-Er unit. It contains refrigeration and pumping equipment as well as thermostatic and safety controls.*

## *Coming Next Month...*

**"The Compounding of Transparent Rubber"—by Ralph F. Wolf, Columbia-Southern Chemical Corp., Barberton, Ohio.**

Part II of an article which begins in this issue. The second installment covers styrene-butadiene, nitrile, neoprene and butyl rubbers.

**"How Voit Rubber Increased Productive Capacity Through Installation of a High Pressure Banbury-Extruder Combination"—by G. R. Gonyer, Farrel-Birmingham Co., Inc., Ansonia, Conn.**

Relating how Voit Rubber increased its mixing capacity by installing a high pressure Banbury-extruder combination designed for complete automation.

**"The Chemistry of Reinforcement. III—Model Systems Containing Carbon Black and Squalene"—by Merton L. Studebaker and Lester G. Nabors, Rubber Chemicals Division, Phillips Chemical Co., Akron, Ohio.**

The concluding part of a three-part article which began in the January, 1957, issue. Part III represents a survey made to show the relationships between certain fundamental properties of carbon black and a model system utilizing squalene as a substitute for natural rubber.

**"Compounding Silicone Rubber for Minimum Shrinkage" by J. J. Deasy and B. B. White, Silicone Products Department, General Electric Co., Waterford, N. Y.**

A study showing how minimum shrinkage may be obtained by choosing a specific combination of fillers, gum and curing agent.

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# THE CHEMISTRY OF REINFORCEMENT

## II—Scorch in Natural Rubber Stocks Containing Carbon Black

By MERTON L. STUDEBAKER and LESTER G. NABORS

*Rubber Chemicals Division, Phillips Chemical Company, Akron, Ohio*

ONE of the difficult problems which confront carbon black and rubber chemists involves the relationship between the physical and chemical properties of carbon black and scorch. Certain generalities are evident. Thus, the high oxygen, low pH channel blacks are known to be less scorchy than the low oxygen, high pH furnace blacks *(1)*. High surface areas of carbon black have also been associated with scorchiness *(2)*. Other factors to which troublesome scorch behavior has been attributed are high "structure" and "increased carbon gel activity" *(1, 2)*. It is also common knowledge that scorch time decreases with increased carbon black loading. But these generalities have not been sufficient to explain, for example, the differences in scorch behavior between furnace blacks of a similar type. The present study was undertaken in an attempt to throw additional light upon the subject. In this paper only natural rubber stocks will be discussed.

Craig et al *(3)* in their excellent study of the effect of hydrogen sulfide on vulcanization indicate that the presence of this material in suitable quantities is necessary for vulcanization with TMTD (tetramethylthiuram disulfide) as well as in sulfur cures with other accelerators. Hydrogen sulfide was thought to be the initiator for vulcanization of such stocks. A certain minimum concentration appears to be required for initiation, but an excess inhibits vulcanization. Delayed action in accelerators was ascribed to their ability in the presence of zinc oxide to absorb the hydrogen sulfide which is produced by reaction of sulfur radicals with the reactive hydrogen of rubber. Other reactions giving rise to hydrogen sulfide are possible. It was indicated that the hydrogen sulfide formation step controls scorch. Craig et al emphasized that each accelerator system should be investigated separately. In the present study only 2-mercaptobenzothiazole and two of its derivatives were used as accelerators.

Note: This paper was presented before the Division of Rubber Chemistry, American Chemical Society, Cleveland, Ohio, May 10, 1956.

### Reaction Between Carbon Black and Hydrogen Sulfide

In the first paper in this series *(4)* the reactivity of carbon black with hydrogen sulfide is discussed. It seems appropriate, however, to describe certain preliminary experiments carried out prior to that more detailed study, because they indicate the sensitivity of the reaction to environment and suggest that the very nature of the rubber-hydrogen sulfide system would be expected to be susceptible to oxidizing, reducing or catalytic effects associated with the compounding ingredients and the conditions of vulcanization.

A sample of Spheron 9 (EPC) in a platinum boat, except where otherwise noted, was treated with hydrogen sulfide for one hour at 150°, 300°, or 600°C. The sample was first dried for one hour at 150°C. in a stream of dry nitrogen. It was then placed in a tube filled with dry nitrogen and brought up to the treating temperature. The nitrogen was then displaced with hydrogen sulfide, and hydrogen sulfide was passed over the sample at the rate of 10 ml./min. for one hour. The hydrogen sulfide was then displaced with dry nitrogen at the treating temperature. Next, the tube was evacuated, and the vacuum released with dry nitrogen and cooled to room temperature in an atmosphere of dry nitrogen. The sample was then transferred to a "pig", weighed and analyzed for carbon and hydrogen or for sulfur. In each experiment, two samples were treated simultaneously, one sample being used for the carbon and hydrogen determinations and the other for the sulfur analysis.

The hydrogen sulfide was made from ferrous sulfide and 3N hydrochloric acid. The gas was passed

TABLE I—ANALYSES OF SPHERON 9 (EPC) TREATED ONE HOUR WITH HYDROGEN SULFIDE AT VARIOUS TEMPERATURES

| Sample No. | Treating Temperature | % Gain in Wt. During Treatment | % H | % C | % Ash | % S | % O By Diff. |
|---|---|---|---|---|---|---|---|
| Spheron 9 | Untreated* | — | 0.71 | 95.76 | 0.00 | 0.03 | 3.50 |
| 2 | 150°C. | 0.68 | — | — | — | 0.81 | 3.94 |
| 3 | 150 | 1.26 | 0.73 | 94.51 | 0.01 | — | |
| 6 | 300 | 0.34 | — | — | — | 0.74 | 3.47 |
| 7 | 300 | 0.39 | 0.69 | 95.08 | 0.02 | — | |
| 10 | 600 | 0.95 | — | — | — | 4.20 | 3.33 |
| 11 | 600 | 1.51 | 0.51 | 93.50 | 0.00 | — | |
| 12 | 600 (Porcelain boat) | 1.33 | — | — | — | 2.66 | |

* Dried for one hr. @ 150°C. in dry nitrogen (10 ml./min.)

TABLE IIA—EVOLUTION OF HYDROGEN SULFIDE FROM MIXTURES OF CARBON BLACK AND UNPURIFIED REAGENT GRADE SULFUR

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Reagent Grade Sulfur | 4.00 g. | .... | .... | 4.00 g. | 20.00 g. | 4.00 g. | 20.00 g. |
| Philblack O * | .... | 1.000 g. | .... | 1.000 | 1.000 | .... | .... |
| Philblack E * | .... | .... | 1.000 g. | .... | .... | .... | .... |
| Spheron 9 * | .... | .... | .... | .... | .... | 1.000 | 1.000 |
| mg. $H_2S$ Evolved | 0.4 | 0.05 | 0.06 | 1.7 | 2.50 | 1.03 | 2.56 |

TABLE IIB—EVOLUTION OF HYDROGEN SULFIDE FROM MIXTURES OF CARBON BLACK, SQUALENE AND SULFUR PURIFIED BY THE PROCEDURE OF BACON AND FANELLI

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Purified Sulfur *(7)* | 4.00 g. | 4.00 g. | 4.00 g. | 4.00 g. | 4.00 g. | 0.15 g. | 0.15 g. |
| Philblack O * | .... | 1.000 | .... | .... | .... | .... | .... |
| Philblack E * | .... | .... | 1.000 | .... | .... | .... | 2.50 |
| Spheron 9 * | .... | .... | .... | 1.000 | .... | .... | .... |
| Acetylene Black * | .... | .... | .... | .... | 1.000 | .... | .... |
| Squalene | .... | .... | .... | .... | .... | 5.00 | 5.00 |
| mg. $H_2S$ Evolved | 0.05 | 0.10 | 0.10 | 0.10 | 0.06 | 0.02 | 1.03 |

* For properties of these samples of carbon blacks see Table III.

through a liter of distilled water to remove traces of hydrogen chloride and then through 100 ml. of water in a second flask, finally being dried by passing over anhydrous calcium sulfate. The apparatus was swept with hydrogen sulfide overnight to remove traces of air. The analyses of the products obtained are listed in Table I.

In experiments at 600°C., during the treatment with hydrogen sulfide the platinum boats turned a blue color, which disappeared on combustion. A run was made with an empty platinum boat in a cleaned tube, and the blue coloration was not obtained. Some Spheron 9 was added to the boat, and the blue coloration again appeared. The Spheron 9 was brushed from the boat, and the weight of the boat plus "coloration" was determined. The boat was then heated in the apparatus for determining sulfur, and the amount of sulfur found was only slightly less than the weight of the blue film on the boat. (Weight of film, 0.141 mg.; weight of sulfur found, 0.127 mg. The difference is probably larger than the experimental error, and it is quite likely that all of the Spheron 9 was not removed from the boat.)

Because of this situation, the sulfur analysis for Sample 10 was high, and the run was repeated with a porcelain boat (Sample 12). There was no blue coloration when the sample was contained in the porcelain boat, and no deposit of sulfur was found in the tube. However, the platinum sled on which the porcelain boat rested turned blue on the portions surrounding the boat. It was not coated for a short distance from the boat, but was blue again on the end. An empty platinum boat introduced at this point turned blue, and there were specks of carbon in the tube.

In a preliminary experiment at 150°C., the hydrogen sulfide was not allowed to sweep through the apparatus overnight, and it is believed that oxygen was present in the treating gases. Under these conditions, copious quantities of sulfur were found which deposited out at both ends of the furnace. However, there was no deposit around the platinum boats which contained the samples. After treatment and weighing back, the boat and the contents were inspected for particles of elemental sulfur, but none were found. The sulfur content of the sample so prepared was 3.17%. This should be compared with Sample 3 of Table I which contained only 0.81%.

TABLE III—SULFIDE SULFUR IN SOLID PHASE REMOVED FROM MIXTURES OF CARBON BLACK, SULFUR (UNPURIFIED), MBT AND LAUREX AFTER HEATING AT 150°C. FOR ONE HOUR FOLLOWED BY TOLUENE ETRACTION FOR 30 DAYS

| Ingredients | Carbon Black Properties* Bet Surface Area | Oxygen Content | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Spheron 9 | 108.6 $m^2/g.$ | 3.50% | 5.00 g. | .... | .... | .... | .... | .... |
| Spheron 6 | 128.5 | 3.20 | .... | 5.00 g. | .... | .... | .... | .... |
| Spheron N | 360.7 | 3.17 | .... | .... | 5.00 g. | .... | .... | .... |
| Philblack E | 142.9 | 2.16 | .... | .... | .... | 5.00 g. | .... | .... |
| Philblack O | 75.1 | 0.72 | .... | .... | .... | .... | 5.00 g. | .... |
| Acetylene Black | 58.0 | 0.11 | .... | .... | .... | .... | .... | 5.00 g. |
| Sulfur | | | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 40.00 |
| MBT | | | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 |
| Laurex | | | 0.300 | 0.300 | 0.300 | 0.300 | 0.300 | 0.300 |
| Milligrams of Sulfide Sulfur (Total) | | | 1.0 | 2.0 | 1.5 | 5.0 | 8.0 | 5.5 |
| Milligrams of Sulfide Sulfur per Square Meter of Carbon Black Surface x $10^3$ | | | 1.84 | 3.1 | 0.83 | 7.0 | 21.3 | 19. |

* Detailed ultimate analyses of these carbon black samples are listed in Table Ib of the third paper in this series.

TABLE IV—SULFIDE SULFUR IN SOLID PHASE REMOVED FROM MIXTURES OF SQUALENE, CARBON BLACK, PURIFIED SULFUR, MBT AND LAUREX AFTER HEATING AT 150°C. FOR ONE HOUR FOLLOWED BY TOLUENE EXTRACTION FOR 30 DAYS

| | | | | | | |
|---|---|---|---|---|---|---|
| Spheron 9 * | 2.5 g. | .... | .... | .... | .... | .... |
| Spheron 6 * | .... | 2.5 g. | .... | .... | .... | .... |
| Spheron N * | .... | .... | 2.5 g. | .... | .... | .... |
| Philblack E * | .... | .... | .... | 2.5 g. | .... | .... |
| Philblack O * | .... | .... | .... | .... | 2.5 g | .... |
| Acetylene Black * | .... | .... | .... | .... | .... | 2.5 g. |
| Squalene | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Sulfur (purified) | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 |
| MBT | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |
| Laurex | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 |
| mg. Sulfide Sulfur (Total) | 2.5 | 3.5 | 3.5 | 6.5 | 7.0 | 7.5 |
| mg. Sulfide Sulfur per m.² of Carbon Surface x $10^3$ | 9.2 | 10.8 | 3.9 | 18. | 37. | 52. |

* These are the same carbon black samples used in the mixtures reported in Tables IIa, IIb, and III.

Carbons are known to be very effective catalysts for the oxidation of hydrogen sulfide to sulfur in the presence of oxygen. In fact, they have been used for this purpose commercially *(5)*. This last experiment indicates that carbon is able to act as a very effective catalyst in the oxidation of hydrogen sulfide to sulfur at vulcanizing temperatures (150°C.). Although oxygen appears to be required, this is probably always present in limited amounts in commercial rubber compounds.

## Formation of Hydrogen Sulfide in the Presence of Carbon Black

In the light of Craig's work, the reactivity of carbon black and hydrogen sulfide, and the copious production of sulfur from hydrogen sulfide in the presence of channel black and air, it was considered desirable to study the production of hydrogen sulfide from sulfur in the presence of carbon black.

When soluble zinc salts are present in excess, it is assumed that they react with substantially all of the hydrogen sulfide to form zinc sulfide unless some other material is present to react with them. (This has been confirmed by experiments on a number of mixtures. However, hydrogen sulfide is removed before it can react quantitatively with zinc compounds when the experiments are conducted under slight vacuum.)

Carbon black (1.000 g.) was heated with sulfur (4.00 g.) at 150°C. for one hour in a stream of nitrogen. The hydrogen sulfide produced was determined by a procedure similar to that used by Hull, Olsen and France *(6)*. Reagent grade sulfur, presumably containing hydrocarbons as impurities, was used in one set of experiments (see Table IIa). A considerable amount of hydrogen sulfide was evolved in one hour's heating at 150°C. The blank with no carbon black was 0.0001 g. sulfide sulfur evolved per gram of sulfur.

When the sulfur was purified by the procedure of Bacon and Fanelli *(7)*, only minute amounts of hydrogen sulfide were evolved from the sulfur in the absence or in the presence of carbon black (see Table IIb). When 0.15 g. of purified sulfur was heated with 5.00 g. of squalene, virtually no hydrogen sulfide was evolved. But when 2.50 g. of Philblack E (SAF) was added to this mixture, analytically significant amounts of hydrogen sulfide were slowly evolved. These and many other experiments indicate that a source of readily available hydrogen must be present if appreciable quantities of hydrogen sulfide are to be evolved. During the vulcanization of an ordinary rubber compound, many sources of hydrogen are present including the rubber itself. Carbon black is believed to exert a catalytic effect on hydrogen sulfide production.

Another series of mixtures was prepared containing various carbon blacks, unpurified sulfur, MBT (mer-

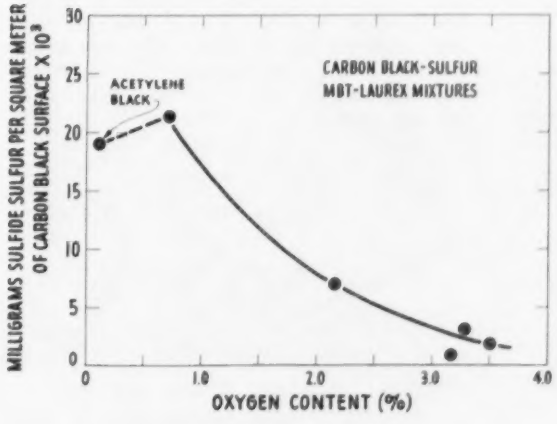


*FIG. 1—Relationship between carbon black properties and sulfide sulfur formation in carbon black-sulfur-MBT-Laurex mixtures. (Data of Table III).*

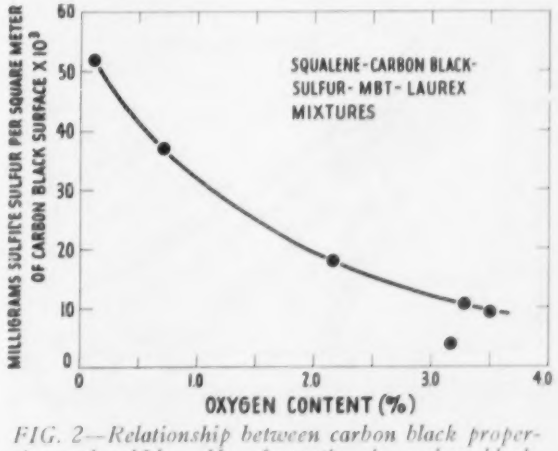


*FIG. 2—Relationship between carbon black properties and sulfide sulfur formation in carbon black-squalene-sulfur-MBT-Laurex mixtures. (Data of Table IV).*

TABLE V—MOONEY SCORCH VALUES FOR VARIOUS CARBON BLACK LOADED STOCKS ACCELERATED WITH SANTOCURE

| | |
|---|---|
| Smoked Sheets | 100.0 |
| Carbon Blacks | Varied |
| Zinc Oxide | 5.0 |
| PBNA | 1.0 |
| Stearic Acid | 3.0 |
| Paraflux 2016 | 5.0 |
| Santocure | 0.4* |
| Sulfur | 2.5 |

* Except 0.7 for Spheron 9

| | Surface Area From $N_2$ Adsorption | % Oxygen | Mooney Scorch Time (Minutes) @ 250°F. Carbon Black Loading 20 PHR | 35 PHR | 50 PHR | 75 PHR | 100 PHR |
|---|---|---|---|---|---|---|---|
| Pelletex | 28 | 0.51 | (a) | 42 | 34 | 29 | 22 |
| Philblack A | 42 | 0.34 | (a) | 32 | 24 | 12 | 1 |
| Acetylene Black | 58 | 0.15 | (a) | 37 | 31 | 18 | 8 |
| Philblack O | 74 | 0.84 | 39 | 27 | 22 | 11 | 2 |
| CK-4 | 95 | 3.25 | (a) | 28 | 25 | 18 | 18 |
| Spheron 9 | 109 | 3.00 | (a) | 41 | 35 | 26 | 18 |
| Philblack E | 131 | 1.39 | 40 | 25 | 18 | 9 | (b) |

(a) Did not scorch in 45 minutes. (b) Scorched on the mill.

captobenzothiazole) and Laurex (zinc laurate). The mixtures were heated for one hour at 150°C., extracted 14 days with toluene, dried and analyzed for sulfide sulfur. The results are presented in Table III. They show that with the exception of acetylene black, there was a general decrease in sulfide sulfur with increasing oxygen content of the carbon black. The mixture containing 5 g. of acetylene black in 20 g. of sulfur was not as fluid as the mixtures containing the other carbons. Even increasing the amount of sulfur to 40 g. did not satisfactorily correct this situation, and the heating of the mixture was probably not comparable to that of the other mixtures. These results indicate (a) that the compounding ingredients which are normally present in compounded rubber will produce sulfide sulfur and (b) that the sulfide sulfur level is lower in the presence of channel blacks than it is in the presence of furnace blacks.

Another series of mixtures was prepared containing carbon black, squalene, research grade sulfur, MBT and Laurex. This mixture was selected to more nearly approach a rubber compound. Squalene, with its condensed isoprene structure, was substituted for rubber. After heating for one hour at 150°C., the samples were extracted with toluene for 30 days and dried. Any insoluble zinc sulfide remained in the carbon black residue. Sulfide sulfur determinations once again appear to be influenced by the oxygen content of the carbon black (see Table IV). The amount of sulfide sulfur per gram of carbon black was surprisingly large in spite of the large reduction in sulfur level. Evidently reaction between sulfur and labile hydrogen atoms of the squalene in the presence of the other compounding ingredients results in the enhanced production of hydrogen sulfide.

If hydrogen sulfide formation is catalyzed by carbon black, its quantity in these experiments should be directly proportional to the surface area of the carbon black in the mixtures. And if oxygen content affects the quantity of hydrogen sulfide which is formed, we should be able to demonstrate this by plotting the quantity of sulfide sulfur per unit of surface against oxygen content of the carbon black. This relationship is evident from Figures 1 and 2.

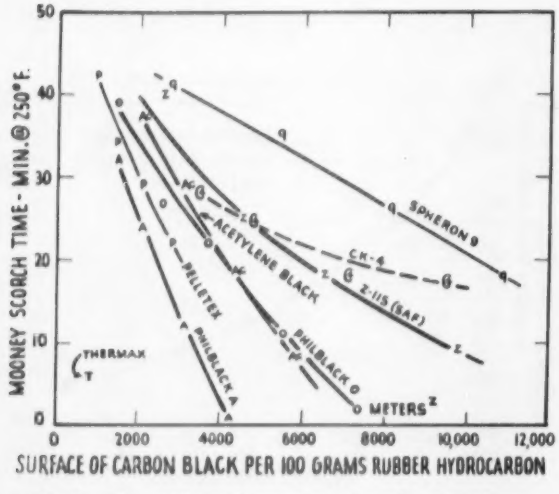


*FIG. 3—The effect of amount of carbon black surface per unit of rubber hydrocarbon and type of carbon black upon Mooney scorch time. (Data of Table V).*

## Influence of Carbon Black Properties and Loading on Scorch

It is common knowledge that scorch time decreases with increased carbon black loading. The scorch data for a Santocure (N-cyclohexyl-2-benzothiazole-sulfenamide) accelerated, natural rubber-carbon black loading study (Table V) were found to plot out in a regular manner against the total area of carbon black added to a given weight of rubber (Figure 3). With the exception of the German carbon black, CK-4, all curves seem to fit into the same general pattern. Thus, it was possible to obtain areas of a given carbon black surface which were required to give constant scorch times in the basic rubber compound used. These were found to be dependent upon the oxygen content of the carbon black samples (Figures 4 and 5). An empirical equation representing this dependence of scorch time for the compound tested is:

$$\text{Mooney Scorch Time} = \frac{900 \times (\%\ \text{Oxygen})^{0.43}}{\text{Surface Area of Carbon in 1 g. RHC}} \quad (1)$$

Acetylene black and CK-4 do not obey this relationship.

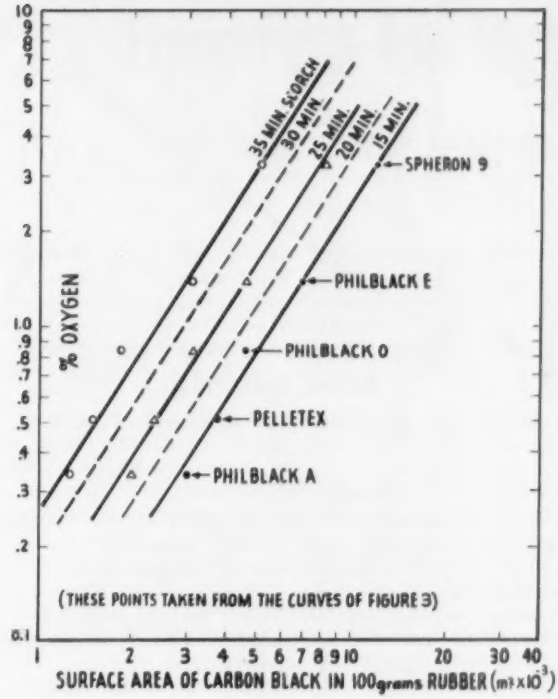


*FIG. 4—Relationship between the amount of carbon black surface per unit of rubber hydrocarbon, oxygen content of carbon black and Mooney scorch time. (Data of Table V).*

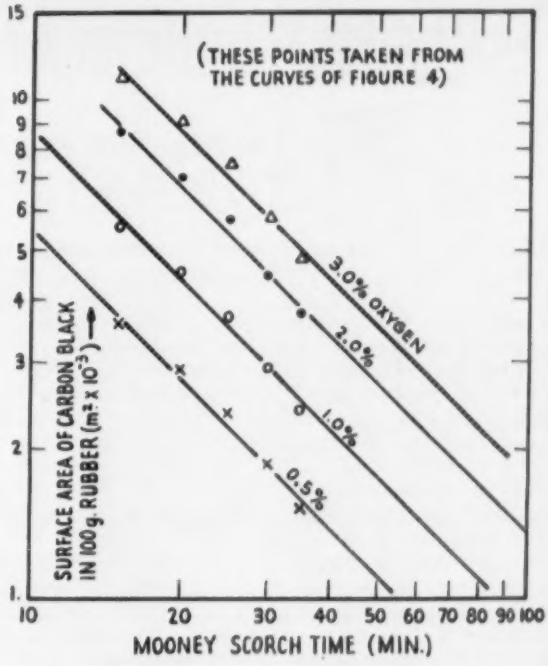
(THESE POINTS TAKEN FROM THE CURVES OF FIGURE 4)
3.0% OXYGEN
2.0%
1.0%
0.5%
SURFACE AREA OF CARBON BLACK IN 100 g. RUBBER (m² x 10⁻³)
MOONEY SCORCH TIME (MIN.)

*FIG. 5—Replot of data in Figure 4.*

According to equation (1) the product of the Mooney scorch time and surface area of carbon black in one gram of base stock should plot out against the oxygen content of the carbon black on logarithmic paper with a slope of 0.63. This is demonstrated in Figure 6. The deviations at high loadings are believed to be due to our inability to maintain constant mixing temperatures for these stiff mixtures.

A similar study was made at one loading with a series of MBTS accelerated stocks (Table VI and Figure 7). The correlation is believed to be within the experimental accuracy of the data. The relationship shown in Figure 7 can be expressed by the equation:

$$\text{Mooney Scorch Time} = \frac{356 \times (\%\ \text{Oxygen})^{*.67}}{\text{Surface Area of Carbon in 1 g. RHC}} \quad (2)$$

Similar studies were attempted on MBT accelerated stocks. These stocks gave such short scorch times that they are considered experimentally unsuitable for testing the generality of the relationship. However, even in this case a rough correlation was obtained which is believed to be as satisfactory as the experimental data.

It is interesting to note that the sulfide sulfur contents of the MBT accelerated stocks when cured at 250°F. for the scorch periods fell between 0.04 and 0.075 mg. per gram of base stock. In this series seven blacks were studied at four loadings of 25, 50, 75 and 100 phr. The MBTS accelerated stocks had sulfide sulfur contents which ranged from 0.06 to 0.08 mg. per gram of base stock. Of course, the sulfide sulfur contents represent only that part of the hydrogen sulfide which reacted with the zinc compounds. They do not reflect the amount which reacted with the carbon black, rubber and accelerator. However, it is interesting that the over-all spread of the values was rather small. Optimum cures of these rubber compounds have sulfide sulfur contents many times these values.

## Discussion

For the natural rubber stocks which were studied, the dependence of scorch time upon the surface area and oxygen content of the carbon black appears to be expressed by the equation:

$$\text{Mooney Scorch Time} = \frac{A \times (\%\ \text{Oxygen})^{*}}{\text{Surface Area of Carbon in 1 g. RHC}} \quad (3)$$

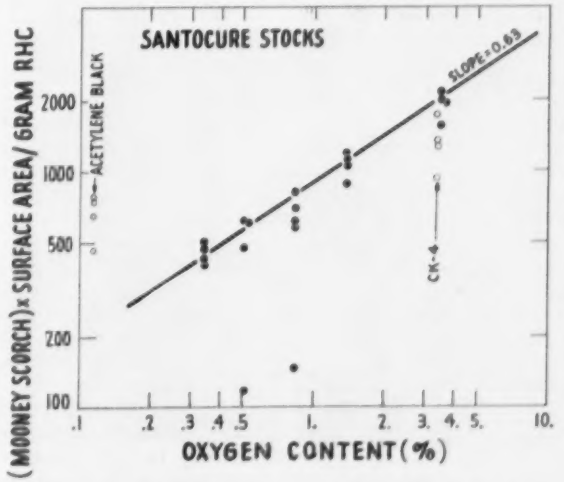


*FIG. 6—Fit of equation (1) to data in Table V.*

TABLE VI—MOONEY SCORCH VALUES FOR MBTS ACCELERATED STOCKS

| | |
|---|---|
| Smoked Sheets | 100 |
| Carbon Black | 50 |
| Laurex | 3 |
| Zinc Oxide | 5 |
| Sulfur | 3 |
| MBTS | 1 |

| | Carbon Black Properties | | |
|---|---|---|---|
| Carbon Black | Surface Area from $N_2$ Adsorption ($m^2/g.$) | Oxygen Content (%) | Mooney Scorch @ 250°F. (min.) |
| Pelletex | 27.1 | 0.22 | 12 |
| Philblack A | 45.8 | 0.58 | 10 |
| Philblack O | 79.6 | 0.79 | 9 |
| Philblack E | 135.1 | 1.01 | 8 |
| Spheron 9 | 115.8 | 3.49 | 16 |
| Spheron 4 | 152.7 | 3.28 | 12 |
| Acetylene Black | 66.8 | 0.15 | 10 |
| Elf O | 171.0 | 4.89 | 16 |

According to this relationship, scorch time should decrease with increasing surface area per gram of carbon black and with carbon black loading. This dependence suggests a catalytic effect. It is believed that hydrogen sulfide formation is catalyzed by the carbon black, although the possibility of other catalytic effects is certainly not excluded.

The dependence of scorch time upon oxygen content is different (Equation 3). Since catalysis appears to be involved, and the product of the Mooney scorch times and surface area per gram of rubber hydrocarbon contains the effect of loading, we do not have a term remaining which involves both oxygen content and loading. It is the oxygen content per unit weight of carbon black rather than the total carbon black-held oxygen in the stock which is involved. This suggests that the oxygen content acts to control the oxidation-reduction environment in the rubber compound. This is analogous to the action of a buffer in controlling the pH level in a solution. However, no comparable term is in general use to apply to "oxidation-reduction buffers," although Remick *(8)* suggested that the term "poising solution" be used to express the redox equivalent of a buffered solution. It would seem that some kind of oxidation-reduction potential of the carbon black is involved, and it is hoped that measurements of this type will be forthcoming.

## Summary

Starting with the premise that scorch of accelerated rubber compounds is dependent upon their hydrogen sulfide level, we proceeded to study the chemical interaction of carbon black and hydrogen sulfide. It was shown that hydrogen sulfide reacts with carbon black, and hence that this material would compete with accelerators, rubber and zinc compounds for any hydrogen sulfide which is present. Experiments were presented to show that hydrogen sulfide formation is catalyzed by carbon black. This would result in decreasing scorch times in direct proportion to the area of carbon black present in the base stock. The oxygen content of the carbon black reduces the hydrogen sulfide level in the rubber compound and, hence, increases scorch times. It is suggested that this is largely due to its influence on the oxidation-reduction environment in the rubber compound.

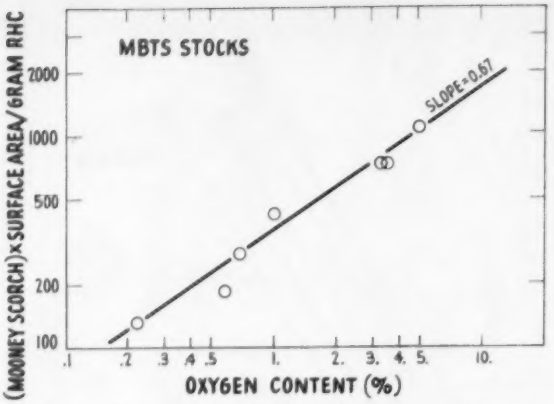


*FIG. 7—Fit of equation (2) to data in Table VI.*

ACKNOWLEDGMENT

The authors wish to thank members of the Phillips Chemical Company's Sales Service Laboratory for obtaining scorch data used in this article, and members of the Research Compounding Laboratory of Phillips Petroleum Company for determining surface areas. Analytical data from the Huffman Microanalytical Laboratories is also gratefully acknowledged.

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## Chem Rubber-Fix Kit

Patch Rubber Co., Dept. E, Box 933, Akron, Ohio, has developed the "Chem Rubber-Fix Kit," for vulcanized rubber repairs without the use of heat, pressure or molds. The kit consists of two materials, which when combined, form a putty that self-vulcanizes within 24 to 72 hours. When the process is completed, the resulting material has the same characteristics as heat-vulcanized rubber, the company says. The material can be hand molded to any shape or thickness, has a shrinkage of less than two per cent and retains its shape permanently. Repairs can be made to conveyor belts, industrial tires, hose, gloves, aprons, footwear, floor coverings, wire insulation, cable sealing, machinery mounting bushings and other articles.

# Equipment for High-Temperature Testing

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PERFORMANCE requirements for rubber products used in the automotive and aircraft fields are increasing rapidly. Thus, the Air Force now requires rubber products capable of service from −80° to +500°F. *(11)*, and a future need for rubbery materials serviceable at temperatures as high as 1000°F. is envisioned.

Variation of tensile strength of vulcanizates with temperature was studied as early as 1910 *(4)*. Several studies which were made on Hevea stocks at temperatures ranging up to 147°C. were summarized by Dawson and Porritt *(7)*. As the various synthetic rubbers became available, the temperature effect on stress-strain properties was studied *(1-3, 5, 6, 8-10, 12, 14-18, 23, 25)*. The stress-strain properties of a number of elastomers measured at temperatures ranging up to 250°C. recently were reported by Konkle, McIntyre and Fenner *(12)*.

Various methods have been used by previous investigators to heat the test specimen in order to obtain stress-strain measurements at elevated temperatures. Test strips have been heated by means of hot air, by immersion in a liquid heat-exchange medium, and by contact with a hot metal surface.

Breuil *(4)*, Somerville and coworkers *(18-21)*, and Thorndike *(24)* used conventional test machines adapted to high-temperature operation by immersion of the test strips or rings and the clamps in water; Morron and coworkers *(16)* and Le Blanc and Kroger *(13)* used alcohol as the liquid heat-exchange medium. At temperatures above the boiling point of water or alcohol, glycerol and ethylene glycol were used as heat-exchange media.

Van Rossem and Van der Meijden *(26)* heated the test rings by immersing them in a bath of mercury, then quickly mounted them on Schopper pulley supports which had been heated in an oven and obtained the test.

A "hot iron" test was developed in the laboratories of the Columbian Carbon Co. *(4)*; the test strip was heated and stretched in contact with a "patch heater" of the type used for spotting or dry mounting photo prints. Braendle, Valden, and Wiegand *(3)* improved this test by cutting a groove in the hot iron to take the dumbbell strip.

The most convenient test arrangement has been to enclose the tensile strip and test area in a hot air oven *(2, 8, 10, 12, 14, 27)*. This arrangement has been used for measuring tensile properties of various synthetic elastomers at temperatures as high as 250°C. *(12)*. This method of heating the sample was adopted for the equipment described here.

## Description of Equipment

The Firestone high-temperature test equipment was designed and developed from a standard Scott Tester in order to obtain tensile, elongation, tear, and adhesion data on various elastomers at elevated temperatures ranging up to 343°C. (650°F.). The basic test mechanism for the high-temperature test equipment was an L-6 Scott Tester having a compensating head for strip gauges ranging from 0.040 in. to 0.130 in., a two speed autographic recorder, dual capacity of 175 lbs. and 300 lbs., and jaw separation rates of 1, 2, 10, 12, and 20 inches per minute.

The machine as received was modified to permit enclosure of the upper and lower clamps and the entire normal axis of extension of the elastomer sample under test within a heavily insulated compartment. The dash pot tube, which permits quick return of the lower jaw, and the gear box were placed outside of the heated compartment.

The main design features of the insulated compartment are: a heating section with temperature regulation; a fan system for circulating the heated air uniformly throughout the test zone; small entrance and exit ports for insertion and removal of test strips; a conveyor rail mechanism for moving test strips and clamps into the test position, and a main door. The main door, having a large glass window area, enables direct observation of the specimen being tested. It need not be opened during operation of the machine, so that rapid loss of heat at high temperatures is avoided.

The heated compartment was made from insulating materials with an interior and exterior framework of angle-iron construction; it has approximate outside dimensions of 61 inches high x 37 inches wide x 25 inches

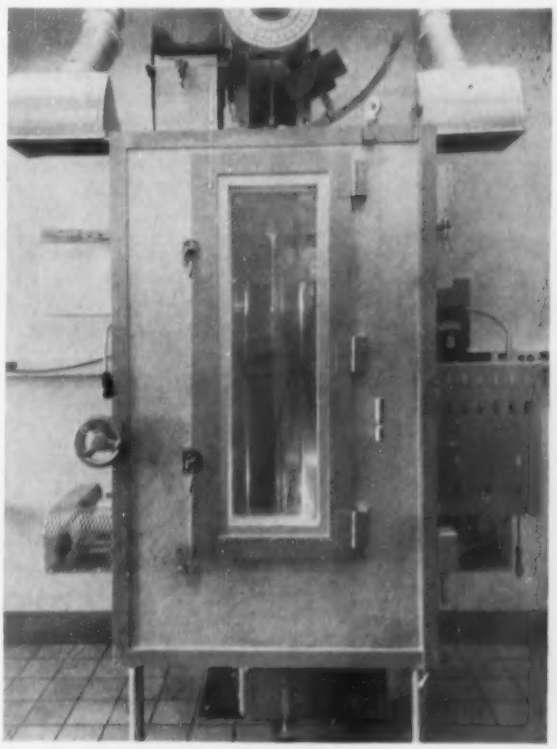

*FIG. 1—Type L-6 Scott Tester modified for operation at elevated temperatures.*

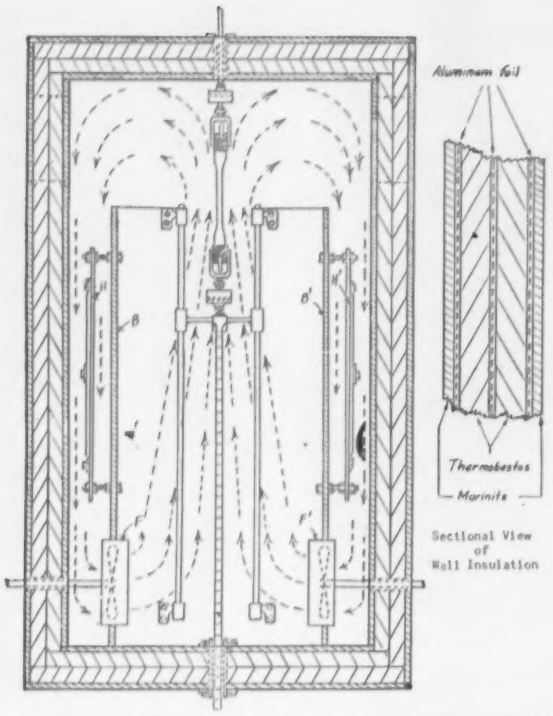


*FIG. 2—Details of heaters, circulating fans, air flow pattern and cabinet insulation.*

deep. The walls are four inches thick and are constructed of two 1.5-inch layers of Thermobestos insulation sandwiched between inner and outer surfaces of 0.5-inch Marinite insulation; in addition, 0.002-inch aluminum foil reflective insulation was placed between the three interior interfaces. Marinite is a hard-surface insulation board composed of asbestos fiber in an inorganic binder, and Thermobestos is a soft insulation block composed of hydrous calcium silicate and asbestos. Both are produced by Johns-Manville Co. Most of the metal parts in the heated interior are of aluminum or steel. Exterior features of the unit are shown in Figure 1.

Heat is supplied by a bank of strip heaters on each side of the compartment which contains both constant and intermittent heaters bolted onto aluminum plates to provide more uniform radiation. Each bank contains six 500-watt heaters and one 250-watt heater which operate from a 208-volt 3-phase line. Heaters on the two banks are paired so that each of five switches controls 1000 watts of continuous heat, one switch controls 250 watts of continuous heat and one switch in series with a Chromalox thermoregulator (Partlow Corp. control model M2-6KL) controls 1000 watts of intermittent heat. The present thermoregulator limits the operating temperature to a maximum of 650°F; however, the cabinet has been heated to 1000°F. and could be controlled at temperatures above 650°F. by installing a thermoregulator designed for a higher temperature range.

Two fans at the bottom of the compartment pull air down the sides past the heater panels and then push it upward through the test zone. Figure 2 shows construction details of the thermal and reflective insulation in the walls, the heater panels (H and H′) on which are bolted strip heaters, the Marinite radiation baffles (B and B′), the circulating fans (F and F′), and the basic flow pattern of heated air within the test compartment.

A distinct advantage of this design over other designs considered was the incorporation of small entrance and exit ports at the sides of the compartment to enable movement of specimens into test position without opening the main door. Use of these ports eliminates most of the heat loss which results from loading and unloading through the main door. In addition, the operator is not exposed to the heated air and the heat radiation which would escape through the door if it were opened while operating at elevated temperatures.

Figure 3 shows details of the slide rail conveyor system with dumbbell strips in clamps in both the standby and test positions. The clamps are placed onto the slide rails (R—R′) through a small entrance port on the left side of the test compartment, the dumbbell strip is then fixed in place in the clamps, and the clamps and specimen then are moved from left to right along the rails through pressure from the guide bars (G—G′) fastened to the conveyor chain (C—C′). In moving along the rails from the entrance port the specimen heats up to the test temperature; therefore, movement of specimens through the test chamber must be carefully controlled timewise so all specimens will have the same pretest treatment.

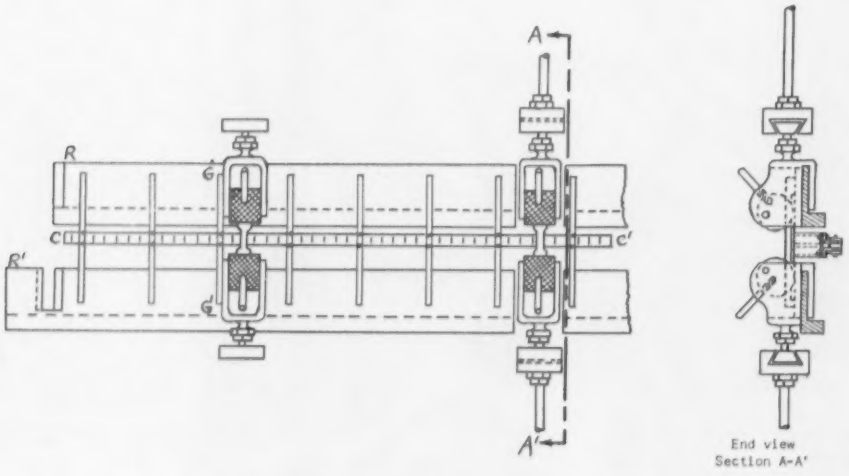


*FIG. 3—Details of conveyor rails, chain and modified clamp.*

Following the test, the clamps and broken strip are moved onto the exit rails from which they are removed from the chamber for reloading. The keystone clamp adapter, shown best as an end view in Figure 3, is used on the ring and adhesion clamps in addition to the type C-1 clamps shown. Figure 4 is a view of the conveyor rails taken from the exit port and showing one set of clamps with a broken strip on the unloading rails, one set in test position and two sets on the loading rails to be tested. The springs used to hold the clamp jaw tightly against the strip can be seen in Figure 4.

The unit can be brought from room temperature to an operating temperature of 550°F. in approximately one hour by application of all heaters (6500 watts). Once this temperature is reached and actual operation of the unit begins, only about 1600 watts are required to maintain test temperature. The surface temperature of the outer Marinite and metal framework when operating at 550°F. is but 100° to 110°F. depending on location; however, the main door glass outer layer (consisting of five layers of 0.25-inch tempered glass each separated by a 0.25-inch air gap) will reach 185°F.

At any given time the maximum temperature difference among different locations in the compartment when operating at 500°F. was found to be 3.7°F. At a given locus in the test zone the temperature variation due to cycling, as the intermittent heater went on and off, was ±3°F. Maximum temperature loss due to the unloading-loading was 10°F. at 540°F., the unloading having the greatest effect; the loss is recovered within thirty seconds. Temperature accuracy of the machine during routine operation with regular loading and unloading procedures ranged from ±3°F. at 200°F. to ±4.25°F. at 500°F.

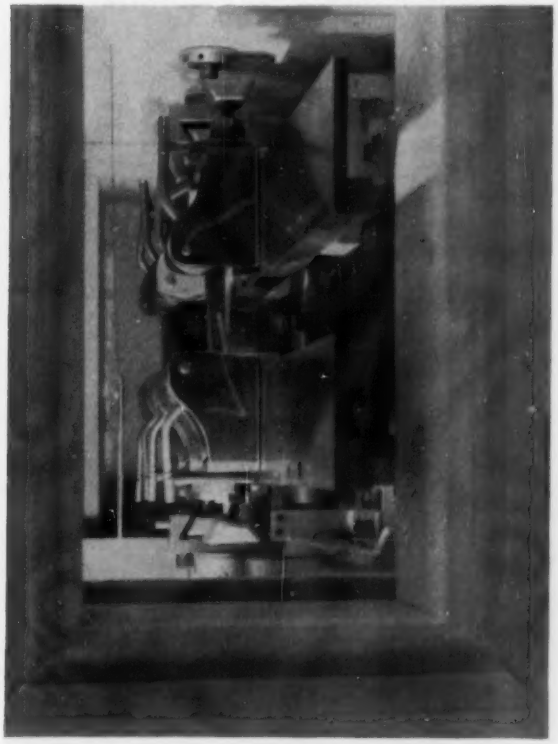

*FIG. 4—Detail view of conveyor rails taken through unloading door showing clamps on unloading rails after testing, in test position and on loading rails prior to testing.*

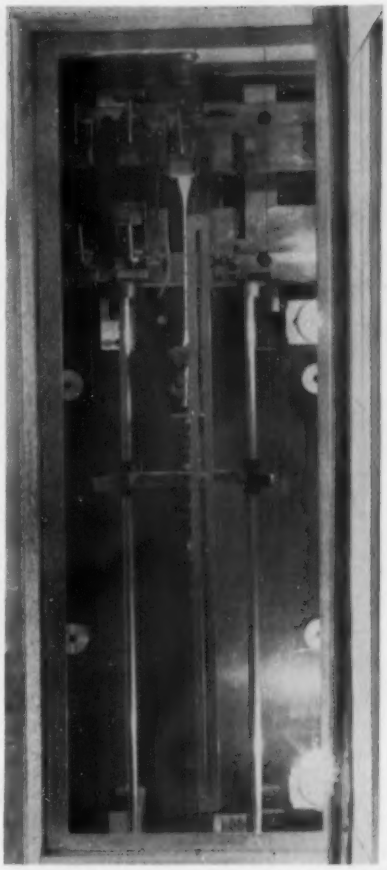

*FIG. 5—Close-up view of interior of hot tensile test equipment showing dumbbell strip under test, elongation measurement scale and clamps on loading rails awaiting test.*

Figure 5 shows a dumbbell strip under test with the zero of the elongation scale held at the top bench mark.

Testing at elevated temperatures obviously will be more time consuming than identical operations carried out at room temperature; however, it has been determined that maintaining a schedule of four minutes between test strips provides ample time for all normal test operation. After a sample is tested, the clamps are removed from the test chamber, the broken strip removed, the clamps placed on the loading rails and a new strip is placed in the clamps, all within the four-minute interval.

Figure 6 shows the operator placing the test strip in the clamps which are already on the loading rails. The hand wheel directly below the operator's right arm is geared directly into the conveyor chain and rail system, and by manual operation it moves the clamps and strips through the test apparatus.

Figure 7 shows the operator during actual test operations with his right hand controlling the position of the elongation scale and his left hand controlling the elongation indexing button. The use of gloves is necessary at operating temperatures above 130°F.

An operation difficulty encountered was the surface oxidation of steel parts of the clamps and slide rails, which greatly increased friction of sliding and rolling components. Use of a graphite film eliminated most of this trouble. The lubricant, "dgf 123" colloidal graphite,

*FIG. 6—Operator placing test strip in clamps.*

was applied by spraying the dispersion contained in a pressurized dispenser can. It is supplied by the Miracle Power Division, A. P. Parts Corp., Toledo, Ohio.

## Details of Test Procedure

The clamps used for testing dumbbell strips are the Scott Tester Model C-1 clamps modified to permit suspension on loading rails and continuous spring closing force on the strips before and during testing.

Dumbbell strip elongation is measured by the scale suspended within the test chamber and adjusted by the operator by means of a counterbalance to hold the zero scale mark even with the top bench mark throughout the test while the operator reads the level of the lower bench mark. One scale division is provided for each 0.2 in., or 20% elongation. Estimates are made to the nearest 10%.

Ring test samples also can be measured, using two Scott Tester Ring Test Spools one-half inch in diameter, the lower spool being continuously revolved during the test by a specially designed gear and rack arrangement. Elongation is determined by a scale which is affixed to the top clamp permanently, with the zero mark of the scale being even with the center of the top spool. The scale, made of ½-in. wide spring steel, slides through a rectangular guide which is attached at the center of the lower spool. Scale divisions are provided every 0.314 in. after an initial zero elongation of 2.35 in. between spool centers, for use with rings having a mean diameter of two inches. No manipulation of the scale is required during the test and the scale guide on the lower spool readily indicates elongation to an accuracy of 5%.

The test chamber is allowed to cycle at the desired temperature for a minimum of one-half hour before loading of samples is begun. Two minutes are allowed for elongating the strip to rupture, recording elongation, unloading the clamps containing the broken strips (except that ring spool clamps are not unloaded), and loading the first strip of a new cycle. One minute then is allowed for setting the compensating head to the gauge of the strip to be tested and returning the recording head to zero.

All tension testing is performed with a jaw-separation speed of 20 inches per minute. All dumbbell and ring samples are cut with a clicking die from test slabs molded in a 6 in. x 6 in. x 0.075 in. cavity.

## Soaking Period

The extended period of time required for the sample to reach the test temperature is a disadvantage of using hot air to heat the test sample, because of the thermal and oxidative degradation which might occur during a long heat soaking period.

Previous investigators have used heat soaking periods ranging from 2 minutes *(8)* to 18 minutes *(14)*. Luttropp *(14)* obtained time-temperature curves and, finding 15 minutes a sufficient preheating time, adopted 18 minutes as the soaking period. Konkle and coworkers *(12)* used a heat-conditioning period of 15 minutes for tests at temperatures which ranged as high as 250°C. We have found six minutes to be the optimum preheating period for use with our machine.

Experiments were carried out to determine the time required for dumbbell strips to reach the test temperature at several different temperature levels. These measurements were made with a thermocouple (iron-constantan, 30 gauge) inserted into the center of a butyl rubber dumbbell strip 0.075 inch in thickness. For temperatures below 300°F., a three-minute period was sufficient if the loading or unloading door was not opened while the strip was being heated. At higher temperatures a somewhat longer time was required.

The required preheat time was found to depend upon the rate of circulation of the heated air contained in the cabinet. With lower fan speed, a longer time was required to reach the test temperature.

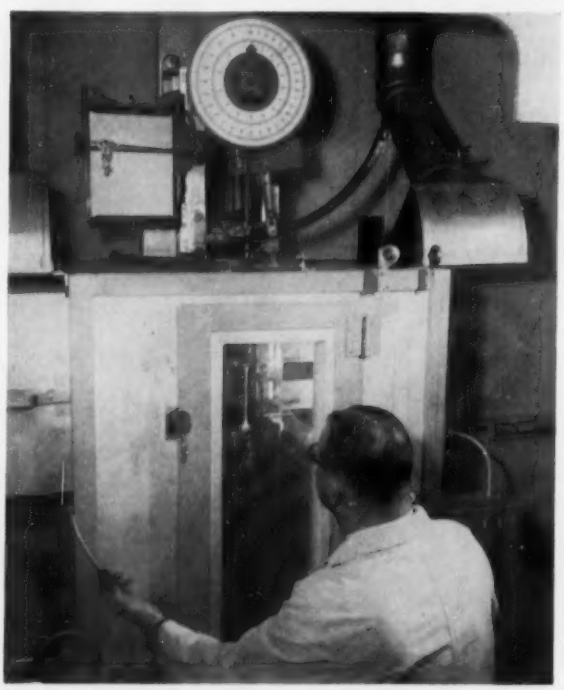

*FIG. 7—High-temperature test machine in operation.*

TABLE I—COMPOUND FORMULATIONS

| | Hevea | GR-S | Butyl Rubber | Neoprene |
|---|---|---|---|---|
| Hevea (smoked sheet) | 100.0 | — | — | — |
| GR-S 1500 (LTP) | — | 100.0 | — | — |
| Butyl GR-I 25 | — | — | 100.0 | — |
| Neoprene GR-T | — | — | — | 100.0 |
| EPC Black | 50.0 | — | — | — |
| ISAF Black | — | 50.0 | — | — |
| SRF Black | — | — | 25.0 | — |
| FEF Black | — | — | 25.0 | — |
| MPC Black | — | — | — | 50.0 |
| Stearic Acid | 3.0 | 3.0 | 1.0 | 0.5 |
| 1,2-Dihydro-2,2,4-trimethyl-6-phenylquinoline | 1.5 | 1.5 | — | 2.0 |
| Paraflux | 4.0 | — | — | — |
| Medium Processing Oil | — | 4.0 | — | — |
| Zinc Oxide | 3.0 | 3.0 | 5.0 | 5.0 |
| Sulfur | 3.0 | 2.0 | 2.0 | — |
| N-Cyclohexyl-2-benzothiazolesulfenamide | 1.0 | 1.2 | — | — |
| 2-Mercaptobenzothiazole | — | — | 0.5 | — |
| Bis (dimethylthiocarbamoyl) disulfide | — | — | 1.0 | — |
| 2,2'-Dithiobis(benzothiazole) | — | — | — | 0.75 |
| Magnesium Oxide | — | — | — | 4.0 |
| Petrolatum | — | — | 2.0 | — |
| Tellurium diethyldithiocarbamate | — | — | 1.0 | — |
| | 165.5 | 164.7 | 162.5 | 162.25 |

## High Temperature Properties of Elastomers

Compounded stocks of four elastomers were mixed by the formulas of Table I, each stock containing fifty parts of carbon black per hundred parts of rubber. One cure of each compound was selected for study. These curing times for the test compounds, which are listed in Table II, were selected after comparing the physical properties on strips which had been cured at 30, 45, 60, and 90 minutes. Each value used in the curing study was the median of the measurements on three strips cut with the A.S.T.M. tension die C (A.S.T.M. Specification D412-51T).

Tensile strengths were measured at room temperature, at 150°F., and at each interval of 50°F. thereafter unless complete failure occurred earlier. Each tensile property listed in Table II is the median of measurements obtained with five strips.

*Hevea Rubber:* Variation of tensile and modulus properties of the Hevea vulcanizate with temperature are shown in Figure 8. The tensile data closely parallel the temperature-tensile properties reported by Tener, Kingsbury and Holt *(22)*, whose data extended up to 140°C. Their stock was accelerated with 2-mercaptobenzothiazole; the carbon black level was 40 parts of gas black. Our stock was accelerated with N-cyclohexyl-2-benzothiazolesulfenamide and contained 50 parts of EPC black.

Tensile properties fell rapidly as temperature rose, so that at 450°F. the tensile strength had declined 95%, down to 240 lbs. per sq. in.

Modulus dropped as temperature rose in the range 200° to 450°F.

*GR-S-1500 (LTP) Rubber:* The logarithm of tensile strength of GR-S-1500 showed a straight-line decline with increase in temperature (Figure 9). This extends the literature data on GR-S, carried previously *(3, 12)* up to a temperature of 300°F. Previous data *(9, 10, 12, 16)* likewise indicated a straight-line relation between temperature and logarithm of tensile strength.

TABLE II—PHYSICAL PROPERTIES OF HEVEA, BUTYL, GR-S AND NEOPRENE VULCANIZATES AT VARIOUS TEMPERATURES

| Elastomers | Hevea | GR-S-1500 | Butyl (GR-I-25) | Neoprene |
|---|---|---|---|---|
| Cure at 280°F., (min.) | 30 | 45 | 30 | 45 |
| **Tested at Room Temperature (73°F.)** | | | | |
| 100% Modulus (lb/sq. inch) | 475 | 400 | 330 | 675 |
| 200% Modulus (lb/sq. inch) | 1200 | 1300 | 665 | 1650 |
| 300% Modulus (lb/sq. inch) | 2150 | 2400 | 875 | 2500 |
| Tensile strength (lb/sq. inch) | 4425 | 4125 | 1550 | 3575 |
| Elongation at break (%) | 530 | 450 | 550 | 500 |
| **Tested at 150°F.** | | | | |
| 100% Modulus (lb/sq. inch) | 510 | 515 | 350 | 1620 |
| 200% Modulus (lb/sq. inch) | 1065 | 1285 | 595 | 1150 |
| 300% Modulus (lb/sq. inch) | 1670 | 2225 | 790 | 1800 |
| Tensile strength (lb/sq. inch) | 3900 | 2615 | 1015 | 2615 |
| Elongation at break (%) | 580 | 330 | 420 | 420 |
| **Tested at 200°F.** | | | | |
| 100% Modulus (lb/sq. inch) | 455 | 490 | 320 | 525 |
| 200% Modulus (lb/sq. inch) | 865 | 1180 | 520 | 985 |
| 300% Modulus (lb/sq. inch) | 1315 | — | 670 | 1585 |
| Tensile strength (lb/sq. inch) | 3015 | 1560 | 785 | 1950 |
| Elongation at break (%) | 600 | 250 | 375 | 360 |
| **Tested at 250°F.** | | | | |
| 100% Modulus (lb/sq. inch) | 415 | 510 | 295 | 460 |
| 200% Modulus (lb/sq. inch) | 745 | 1140 | 485 | 840 |
| 300% Modulus (lb/sq. inch) | 1140 | — | 635 | 1390 |
| Tensile strength (lb/sq. inch) | 1815 | 1270 | 695 | 1670 |
| Elongation at break (%) | 500 | 220 | 340 | 360 |
| **Tested at 300°F.** | | | | |
| 100% Modulus (lb/sq. inch) | 390 | 480 | 310 | 420 |
| 200% Modulus (lb/sq. inch) | 650 | 975 | 475 | 725 |
| 300% Modulus (lb/sq. inch) | 935 | — | 575 | 1210 |
| Tensile strength (lb/sq. inch) | 1400 | 975 | 575 | 1320 |
| Elongation at break (%) | 520 | 200 | 300 | 330 |
| **Tested at 350°F.** | | | | |
| 100% Modulus (lb/sq. inch) | 300 | 460 | 345 | 410 |
| 200% Modulus (lb/sq. inch) | 470 | — | 500 | 740 |
| 300% Modulus (lb/sq. inch) | 620 | — | — | — |
| Tensile strength (lb/sq. inch) | 850 | 805 | 500 | 1120 |
| Elongation at break (%) | 510 | 180 | 200 | 270 |
| **Tested at 400°F.** | | | | |
| 100% Modulus (lb/sq. inch) | 125 | 350 | 310 | 600 |
| 200% Modulus (lb/sq. inch) | 220 | — | 445 | — |
| 300% Modulus (lb/sq. inch) | 320 | — | — | — |
| Tensile strength (lb/sq. inch) | 470 | 490 | 495 | 1000 |
| Elongation at break (%) | 510 | 140 | 250 | 160 |
| **Tested at 450°F.** | | | | |
| 100% Modulus (lb/sq. inch) | 105 | — | 95 | — |
| 200% Modulus (lb/sq. inch) | 175 | — | 185 | — |
| 300% Modulus (lb/sq. inch) | — | — | 260 | — |
| Tensile strength (lb/sq. inch) | 240 | 290 | 330 | 590 |
| Elongation at break (%) | 270 | 80 | 430 | 80 |
| **Tested at 500°F.** | | | | |
| 100% Modulus (lb/sq. inch) | 35 | — | 20 | — |
| 200% Modulus (lb/sq. inch) | — | — | 30 | — |
| Tensile strength (lb/sq. inch) | 75 | 225 | 50 | 285 |
| Elongation at break (%) | 150 | 70 | 255 | 30 |
| **Tested at 550°F.** | | | | |
| Tensile strength (lb/sq. inch) | — | 150 | melted | 205 |
| Elongation at break (%) | — | 20 | melted | 20 |

The tensile strength of GR-S-1500 as measured at 450°F. had declined 93% to 290 lbs. per sq. in.

As temperature increased, the modulus of GR-S-1500 rose slightly and tended to remain almost constant. The rise in modulus is attributed to cross-linking occurring during the testing operation and is in line with the increased modulus which had been observed for longer cures in the same stock during the curing study.

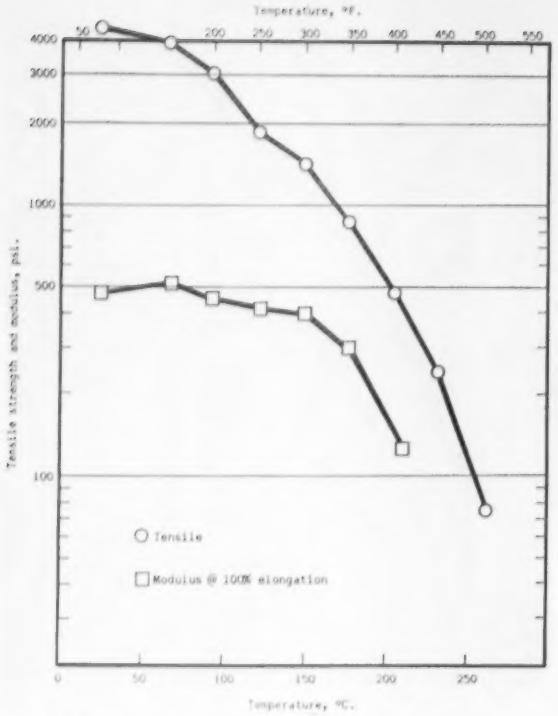


*FIG. 8—Physical properties of a Hevea vulcanizate at elevated temperatures.*

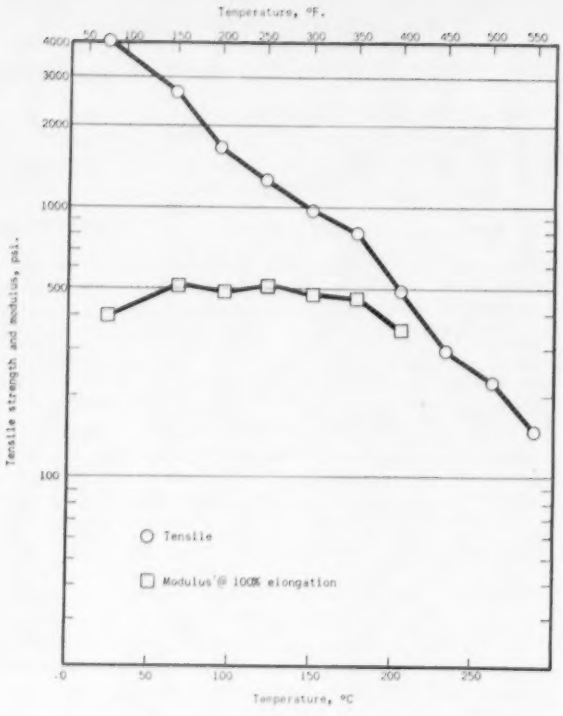


*FIG. 9—Physical properties of a GR-S-1500 vulcanizate at elevated temperatures.*

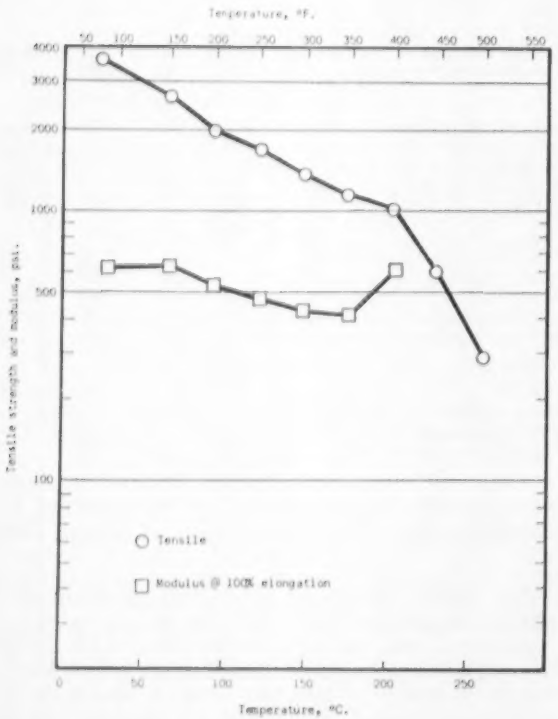


*FIG. 10—Physical properties of a Butyl 325 vulcanizate at elevated temperatures.*

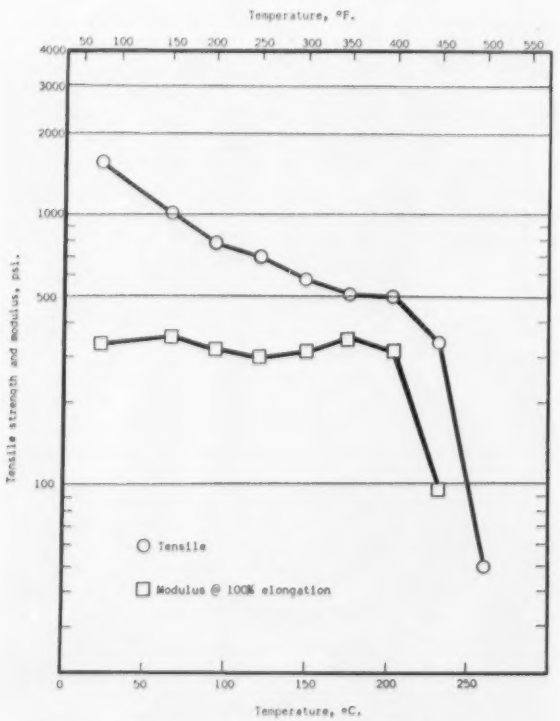


*FIG. 11—Physical properties of a Neoprene Type GR-T vulcanizate at elevated temperatures.*

*Butyl Rubber:* The present butyl compound, cured with a sulfur-2-mercaptobenzothiazole-bis (dimethylthiocarbamoyl) disulfide-tellurium diethyldithiocarbamate curing system, showed a relatively low initial tensile strength of 1550 lbs. per sq. in. (Figure 10.). However, the 400°F. tensile strength of the 495 lbs. per sq. in. was equivalent to the optimum to be expected from butyl rubber at this temperature as reported by Peter *(17)*, and it compares favorably with the 200°C. (392°F.) tensile strength found by Konkle, McIntyre and Fenner *(12)* for a butyl stock cured with dibenzoyl p-quinonedioxime, red lead, and sulfur.

The break in the tensile-temperature curve above 400°F. may indicate that reversion is occurring during the heat soaking.

At 450°F. the tensile strength of butyl rubber was 330 lbs. per sq. in., a decline of 79% from the room temperature tensile strength.

The 100% modulus of the butyl vulcanizate showed a slight decline as the temperature rose to 350 to 400°F., then dropped precipitously. This also suggests that the butyl stock underwent some reversion and softening during the testing in the temperature range above 350°F.

*Neoprene GR-T Rubber:* The neoprene vulcanizate showed exceptional properties with increasing temperature (Figure 11), excelling the literature data *(1, 2, 10, 14, 18)* reported for neoprene stocks at elevated temperatures and coinciding with the maximum tensile performance to be expected from chloroprene rubber vulcanizates at elevated temperatures as reported by Peter *(17)*. Above 350°F. the tensile versus temperature curve turns downward, indicating that decomposition is taking place during the testing operation. At a temperature of 450°F. the tensile strength of the neoprene vulcanizate was 590 lbs. per sq. in., a decline of 83.5% from the room temperature tensile strength.

The 100% modulus of neoprene declined as temperature rose from 150°F. to 350°F., then rose in tests carried out at still higher temperatures. It is concluded that pronounced deterioration and heat stiffening began to occur at test temperatures above 350°F.

## Summary and Conclusions

An apparatus and method have been developed for measuring the tensile and tear properties of elastomers at elevated temperatures. The apparatus, which comprises an oven built around an L-6 Scott Tester, can be operated at temperatures up to 650°F. and can be modified to operate as high as 1000°F.

Tensile properties of Hevea, GR-S-1500, butyl, and neoprene vulcanizates were measured at temperatures ranging from room temperature up to 500°F. and higher.

The high temperature properties for the four elastomers used in the tests are in general agreement with literature data, which describe tensile properties on Hevea *(12)* and GR-S *(3, 12)* up to 300°F. and on butyl rubber *(12, 17)* and polychloroprene *(17)* up to 400°F. At a temperature of 450°F. the tensile strengths of Hevea, GR-S-1500, butyl and neoprene were found to be 240, 290, 330, and 590 lbs. per sq. in., respectively, equivalent to declines of 95%, 93%, 79%, and 83.5% from the tensile strengths at room temperature.

It is apparent from the present studies that tensile properties of these four elastomers, when measured above 350°F. in a hot air medium, will be affected in some degree by chemical changes which occur during the heat-soaking period. These chemical changes include continued curing and cross-linking, heat-softening, reversion, and oxidation.

ACKNOWLEDGMENT

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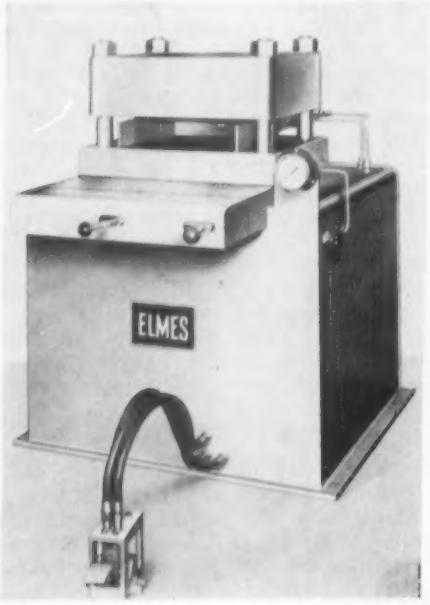
## Elmes Custom-Built Hydrolair Press

To meet special requirements of small press users, a new pumpless, motorless, custom-built hydraulic press is available. A modification of the standard Hydrolair design, the new unit is built by the Elmes Engineering Division, American Steel Foundries, Cincinnati 29, Ohio. Taking its power right from the regular shop air line, the press is said to be economical in operation.

Whereas standard Hydrolairs are of the "moving-up" type, the unit in the accompanying illustration has a




moving-down platen, having been specially designed for an assembly operation wherein manual controls operate the pressing platen and a foot switch is installed for actuating an unloading mechanism. Also, the housing containing the controls has been extended to permit mounting a loading and unloading table at the same level as the press bed.

The press has a 50-ton pressure capacity and for power utilizes a shop air pressure from approximately 80 to 90 psi. The air-oil receiver, Elmes patented air-hydraulic intensifier, hydraulic cylinders, and practically the entire hydraulic circuit are enclosed in the base cabinet for protection. Simple removal of a cover plate permits easy maintenance inspection of the operating system.

## Wheelco Non-Indicating Controllers

Two new models of non-indicating controllers—potentiometer type units designed for use in batch process work—have been made available by the Wheelco Instruments Division of Barber-Colman Co., Rockford, Ill. The Model 151 Amplitrol is a simple on-off controller for applications where transfer lag and dead time can be reduced to negligible value and the simplest control forms made usable. Model 152 is an "anticipatory" time-proportioning controller compensating for system inertia.

The units employ a circuit in which the unknown voltage, supplied by the sensing element, is connected in opposition to a known voltage with any difference used to actuate the control circuit. A known voltage of a value corresponding to the control point desired is imposed from a separate source to the other side of the circuit. The difference between these voltages is fed into a saturable core reactor which amplifies the difference between the unknown and the known voltages and operates so that when the known voltage exceeds the unknown, the amplified difference controls the firing of a thyratron. When the voltage output of the sensing element reaches a value giving null balance, no current flows to the reactor, and the thyratron is "cut off." In this matter, the circuit to the control relay is de-energized.

The contact rating of the new Wheelco 150 Series Amplitrol is 6 amperes at 115 volts A.C. 3 amperes at 230 volts A.C. The sensitivity of the instrument is 75 microvolts for all scale spans. The fixed cycle time of the Model 152 is approximately 18 seconds. The controllers have over-all dimensions of 7-5/8 x 7-25/32 x 8-1/8 inches. The weight is about 7 pounds.

## Tracerlab Automatic Thickness Gage

A new automatic standardizing beta gage has been developed to meet close tolerance requirements of sheet rubber manufacturers. The Model BG-10, product of Tracerlab, Inc., 130 High St., Boston, Mass., utilizes radioactivity and electronic circuitry in its operation. The gage disengages itself from the sheet at a predetermined interval and automatically compensates for any variables which might affect accuracy, such as foreign

material, like dust, collecting on the source and detector windows. This also compensates for the gradual wearing out of the electronic tubes as well as the depreciation in life of the radioactive source. Thus, the gage is said always to read accurately and dependably. If for any reason the gage is unable to reset itself to zero, a signal comes on indicating something is wrong. After completion of the standardizing cycle of fifteen seconds, the detecting unit returns to the measuring position and resumes measuring. The gage is designed to take up a minimum amount of space, has simplified controls and is easily maintained.

# *Editorials . . .*

## Higher Yields

FEW authorities will argue with the fact that the economic future of the natural rubber industry lies largely in increasing the yield per acre. Although some acreage is utilized for new plantings from time to time, it is rather hazardous to risk dollars in a venture which must await six or seven years before any economic return. This situation is, of course, a direct result of the birth, development and growth of the synthetic rubber industry. In view of the situation, replanting is the order of the day, with stress on the very best possible planting material. Increased yields can be secured at fairly moderate extra cost.

In this connection, some very interesting statistics have come to light with the publication of the 1955 edition of the "Rubber Statistics Handbook." Compiled and published by the Department of Statistics of the Federation of Malaya, this work not only contains statistics pertaining to the cultivation and production of natural rubber, but it analyzes trends and points up patterns. The current edition contains, for example, a careful and detailed analysis of yield data.

According to the 1955 edition, Malaya now has a total of 3,500,000 acres planted with rubber. Of this total, 2,025,000 acres are on estates of 100 acres or more. During 1955, approximately 1,610,000 acres of estate rubber in regular tapping produced 353,000 tons of rubber. This is an average yield of 490 pounds per tapped acre for the entire country. During the year, 1,012,000 acres of *known unselected seedlings* on estates produced 160,000 tons of rubber, or 355 pounds per acre tapped. Some 446,000 acres of *known high yielding material* also produced 160,000 tons, or 806 pounds per acre tapped. The difference between 355 and 806 pounds per acre tapped is, to say the least, substantial.

Further analysis of the acreage planted with known high yielding material indicates that of the 446,000 acres which were under cultivation in 1955, approximately 207,000 acres (which produced 60,000 tons) yielded less than 800 pounds per acre, while 239,000 acres (which produced 100,000 tons) yielded more than that amount. To put it another way, the acreage in the lower bracket yielded an average of 650 pounds per acre while that in the higher bracket yielded an average of 940 pounds per acre.

There is still another significant fact revealed by the analysis. Although many factors affect yield performance in practice, it seems a fair assumption that the lower bracket discussed above includes many of the older areas planted with clones and clonal seedlings which have been superseded. Accordingly, it may be assumed that the older high yielding material gave the 650 pounds per acre per year while the newer high yielding material produced the 940 pounds per acre per year. The Malayan Department of Statistics defines high yielding material as "all clonal seedlings and clones (budgrafts) approved by the Rubber Industry Replanting Board."

Reports on yield per acre from specialty budgrafts have ranged as high as 2500 pounds. The Rubber Research Institute of Malaya in large scale field trials has obtained mean annual yields of 1500 to 2100 pounds per acre from selected clones over ten years' continuous tapping. There is no question but that steady gains are being recorded and that within the next several years average yield from all plantations in Malaya will be closer to the 500 pounds per acre mark. This augurs well for the future of the rubber planter and will give some of the manufacturers of synthetic rubber food for thought relative to price structures in the future.

## Realistic Approach

A REALISTIC approach to the current situation seems to have been taken by the House Armed Services Committee in its approval of a bill which authorizes sale of the alcohol-butadiene plant at Louisville, Ky., without restrictions as to its use. It will be remembered that in previous attempts to sell or even lease the plant, the "fly in the ointment" was the security restriction which held that the plant must engage in the production of butadiene. It is now apparent that existing and projected butadiene output through 1958 will exceed expected demand by some 150,000 long tons. Under these conditions, it is evident that the Louisville facility is no longer of vital concern to the national security. The plant was originally constructed in 1943 at an original cost of $31,352,000. This has been depreciated so that the net book value of the plant is now set at about $6,000,000. In the opinion of Carl Vinson (Dem., Ga.), chairman of the House Armed Services Committee, and Laurence B. Robbins, Administrator of the Federal Facilities Corporation, the new legislation will prompt bids in excess of $3,500,000.

# Highlights Sidelights *of the News...*

February, 1957

The House Armed Services Committee has given its approval to a bill designed to help the government sell its alcohol-butadiene plant at Louisville, Ky....The bill authorizes the sale of the facility with no restrictions as to its future use...FFC officials believe that the government will be able to get more than $3.5 million for the plant under the terms of the new legislation (page 853).

Polymer Corp. plans 1957 capital expenditures of $7 million on new projects and $4 million for the completion of work already begun...Close to $5 million will be devoted to capital projects that will increase the company's synthetic rubber and butadiene production capacity (page 880).

Negotiations to centralize the handling of rubber imports in the Port of New York and to set up a special terminal on Staten Island have been suspended...Pending since last summer, the plan was dropped because, it was said, strong elements among importers opposed the centralization scheme (page 853).

A shift in executive personnel at the Firestone Tire & Rubber Co. finds L. R. Jackson in the new post of vice-chairman of the board...R. C. Firestone is the new company president and James E. Trainer has been elected executive vice-president (page 854).

The National Bureau of Standards has added two synthetic rubbers to its list of standard materials for rubber compounding...A total of 15 standard samples are now available from the Bureau (page 858).

News from here and there reveals that: Cleveland Automatic Machine Co. has announced its merger with the J. H. Day Co., with the continuing corporation being Cleveland Automatic (page 878)...Lloyd Manufacturing will open its new thread plant at Lafayette, Ind., in about mid-March (page 857)...The partnership of Sydney L. Albert and Edward J. Harris in the Albert-Harris Co. is said to be under stress because of a patent suit in the offing (page 876)...URW has criticized U. S. Rubber on the proposed closing of the company's Washington, Ind., plant (page 864)...Voit Rubber, recently purchased by American Machine and Foundry, has announced the formation of a new board of directors (page 857).

# NEWS REPORTS and Industry Activities

## LOUISVILLE PLANT SALE EASED IN NEW BILL BEFORE CONGRESS

The House Armed Services Committee has approved a bill designed to help the government sell the alcohol-butadiene plant at Louisville, Ky. The bill, introduced by Committee chairman Carl Vinson (Dem., Ga.), authorizes the sale of the facility with no restrictions as to its use. Under the Vinson proposal, which is endorsed by Laurence B. Robbins, Administrator of the Federal Facilities Corporation, a purchaser would be free to produce any chemical or product he chooses. Furthermore, he would not be required to return the facility to synthetic rubber production if a national emergency arises within ten years after sale.

A committee spokesman has observed that he would not be surprised to see "bids coming from all directions" if the Vinson bill is approved and the FFC puts the plant up for sale without a security requirement. Mr. Robbins thinks that the government can get more than $3.5 million for the plant under the terms of the new bill.

Almost all of the facilities sold heretofore under the synthetic rubber plant disposal program have been subject to security restrictions. It was Representative Vinson's feeling that the government can get a much better price than that offered last Spring when sale of the Louisville plant was first attempted. High bid at that time was $3,125 million offered by the Union Carbide & Carbon Corp.

### *Asks Congressional Authority*

Mr. Robbins formally asked Congress to schedule a second round of industry purchase bids in a letter to Representative Vinson early in January. Mr. Robbins explained that he was unable to rent the plant for a long term during negotiations which collapsed early in December. "Since neither the Publicker Industries bid nor that of Union Carbide & Carbon assured the government the return which the corporation thought should be received," he said, "the only alternative was to attempt to sell without the product or national security requirements."

Last year's sales program fell through because Union Carbide, the high bidder, would not guarantee to produce butadiene. Under the disposal legislation covering the program, it was felt that the sale to Union Carbide would not help promote a competitive synthetic rubber industry.

The Armed Services Committee spokesman states that the plant is not now needed, because existing and projected butadiene output through 1958 will exceed all demand by about 150,000 tons. He said figures furnished by FFC put butadiene capacity by the end of 1958 at 1,037,000 short tons, or 146,164 tons above the annual requirements "for synthetic rubber and all other purposes."

### Non-Insured Pension Funds

According to the Business and Defense Services Administration of the U. S. Department of Commerce, assets of non-insured pension funds in the rubber products industry rose from $34 million in 1951 to $76 million in 1954, a gain of more than 100 per cent. Non-insured pension funds represent those administered by corporations themselves as distinct from those administered by insurance companies for corporations. In the years 1951 to 1954, assets of non-insured pension funds in the chemical and allied products field increased by 93 per cent, while a 75 per cent rise was registered for manufacturing and non-manufacturing industries combined.

## Lamb Buys More Seiberling Stock

According to current reports, Edward O. Lamb and associates have purchased 3,650 additional common shares of the Seiberling Rubber Co., thus arousing speculation that another proxy battle may be in the making. With the recent stock purchases, Mr. Lamb and associates are now said to hold approximately 80,000 of the 414,916 Seiberling shares now outstanding. In a proxy battle which came to a head last April, Mr. Lamb and associates placed four directors on Seiberling's board which now numbers 15.

## PLANS FOR RUBBER TERMINAL IN NEW YORK CITY ABANDONED

Negotiations to centralize the handling of rubber imports in Port of New York, and to set up a special terminal on Staten Island, N. Y., have been suspended according to a joint statement issued by Joseph Cianci, vice-president of the Rubber Terminal Corp. and Vincent A. G. O'Connor, Commissioner of Marine and Aviation. Pending since last summer, the plan was dropped because strong elements of the rubber import industry opposed centralization, the statement said.

It was felt that the project, which involved the establishment of a terminal at Piers 12 and 13 on Staten Island, would bring new traffic to the Staten Island piers which have been largely idle for a number of years. Backers of the plan also believed there would have been an improvement in rubber handling methods, by making possible the use of a modern facility specially built for the purpose.

### *Central Terminal Background*

About eighteen months ago the rubber industry began to consider an invitation to move all rubber handling to a centralized terminal in Port Newark, under the aegis of the Port of New York Authority. Disclosure of this plan caused city officials to act in behalf of the Staten Island plan. While announcing the abandonment of the project, Mr. Cianci said that this decision not only disposed of the Staten Island plan for the time being; it also bespoke the determination of rubber importers not to go to Newark.

Mr. O'Connor said that the move to Newark would have harmed the economy of New York City. It is reported that some 365,000 long tons of raw rubber move through the Port of New York annually. More than 80 per cent of it is handled in New York City, half of this in Brooklyn and the remainder in Staten Island. The imports are valued at about $318,000,000 annually.

Bakelite has issued plans for an 8- by 10-foot hobby greenhouse, which home gardeners can build, using film made of Bakelite polyethylene and rough lumber.

## JACKSON NAMED VICE-CHAIRMAN AS FIRESTONE SHIFTS OFFICERS

Harvey S. Firestone, Jr., chairman and chief executive officer of the Firestone Tire & Rubber Co., has announced that at the annual meeting of its board of directors, Lee R. Jackson requested that he be relieved of his duties as president and was thereupon elected to the new position of vice-chairman of the board. At the same meeting, Raymond C. Firestone was named president of the company, succeeding Mr. Jackson, and James E. Trainer was elected executive vice-president. Also elected were two new vice-presidents, Harvey H. Hollinger and John L. Cohill, and a new treasurer, Elton H. Schulenberg. According to the company, the two new vice-presidential posts were added "to meet the increasing business opportunities of the years ahead".

Mr. Jackson, who has been associated with Firestone for 44 years, was elected director of the company in 1928 and has served as president since 1948. Raymond C. Firestone, who succeeds Mr. Jackson, has served for the past three years as executive vice-president. Previously, he had been vice-president in charge of research and development. Mr. Trainer will succeed Mr. Firestone as executive vice-president.

Mr. Hollinger, named vice-president, joined Firestone in 1913, and has served as treasurer of the company since January 1948. In his new post, he will be in charge of Finance.

Mr. Cohill, former assistant to the president, will be vice-president in charge of Domestic Subsidiary Companies. He joined the company in 1920 at which time he served with Firestone distributors in India. Since then, he has served in many posts at home and abroad.

Mr. Schulenberg joined Firestone's Accounting Department in 1927. From 1945 to his present appointment, he served as assistant treaturer of the company.

Also elected during the annual meeting of the board of directors was John J. Shea as vice-president and chairman of the Finance Committee. Mr. Shea, who joined the staff of the Firestone Accounting Department in 1907, has been vice-president and treasurer since 1941.

### Testing Rubber Windshields

The U.S. Air Force is testing transparent rubber which it hopes may be used as an interlayer to strengthen windshields of supersonic aircraft. Heat generated by air friction at speeds higher than the speed of sound causes the transparent plastic now used to soften and lose strength, making it less able to prevent the glass from shattering if cracked. Working with the Wright Air Development Center, the Dow Corning Corp. developed "Silastic Type K Interlayer" as the center layer for safety glass windshields. Laminated windshields made with Silastic Type K retain full strength and clarity at temperatures ranging from —65 to over 350°F. In the uncured state, Type K is a soft, plastic and extremely tacky sheet, calendered between layers of polyethylene coated paper. Readily flowable under pressure, it requires no bonding adhesive. When laminated and cured under pressure in either flat or curved "glazings", it forms a tough, rubbery interlayer with excellent optical properties.

The board of directors re-elected Joseph Thomas as secretary and general counsel and Claude A. Pauley as comptroller. All other officers of the company were re-elected. The nine directors of the company are: Harvey S. Firestone, Jr., Lee R. Jackson, Raymond C. Firestone, James E. Trainer, John J. Shea, Harvey H. Hollinger, Leonard K. Firestone, Roger S. Firestone, and Joseph Thomas.

### Nash Named Sales Consultant

Alfred Nash, formerly director of sales for Cabot Carbon, Ltd., London, England, has been named as sales consultant to the company. At the same time, the management of the London office of the company was transferred to L. B. MacQueen, who for the past three years had served as Mr. Nash's assistant. In the austere days following World War II, Mr. Nash was one of the strongest advocates of a Cabot carbon black plant in England.

## WASHINGTON HEARS ZAPP ON NATURE OF BUTYL RUBBER

The January 16th meeting of the Washington Rubber Group, held at the PEPCO Auditorium in Washington, D. C., featured an address by Robert L. Zapp of the Enjay Co., on "The Nature of Butyl Rubber and its Compounds With Emphasis on Recent Development in the Fabrication of Butyl Tires." In his talk, Mr. Zapp described the structure and chemical nature of butyl rubber as it affects the properties of vulcanizates.

The speaker reviewed vulcanization with sulfur and the role of the ultra accelerators including their effects upon the crosslink reversion. He also discussed the advantages of the sulfur vulcanizing system and mentioned representative curing systems. Mr. Zapp also discussed the stability of butyl vulcanizates which is a function of its low unsaturation. Reference was made to the types of butyl and formulations for best resistance to high temperature, ozone, and sunlight exposure.

Methods of obtaining superior qualities; heat treatment of butyl pigment masterbatches which profoundly affects vulcanizate quality; changing the nature of the stress-strain curve; improving resilience and resistance to abrasion, were reviewed, including formulations, time-temperature relationships, and the role of promoting agents.

In summary, some recent developments in the fabrication of butyl tires were discussed. These included observations on tire performance and the properties of Enjay Butyl Rubber that contribute to this performance.

### Emery 3049-S Plasticizer

Emery Industries, Inc., Cincinnati, Ohio, has introduced a new high-molecular-weight polymeric plasticizer, "Emery 3049-S." This product is light in color, permits easy processing on conventional equipment, has excellent electrical properties, low migration, resistance to extraction and low volatility, the company states. The viscosity and wetting characteristics of Emery 3049-S make it an excellent plasticizer for dispersion and pigment grinding. The material may be used in the manufacture of infant accessories, upholstery material, industrial tapes and gaskets and many other products.

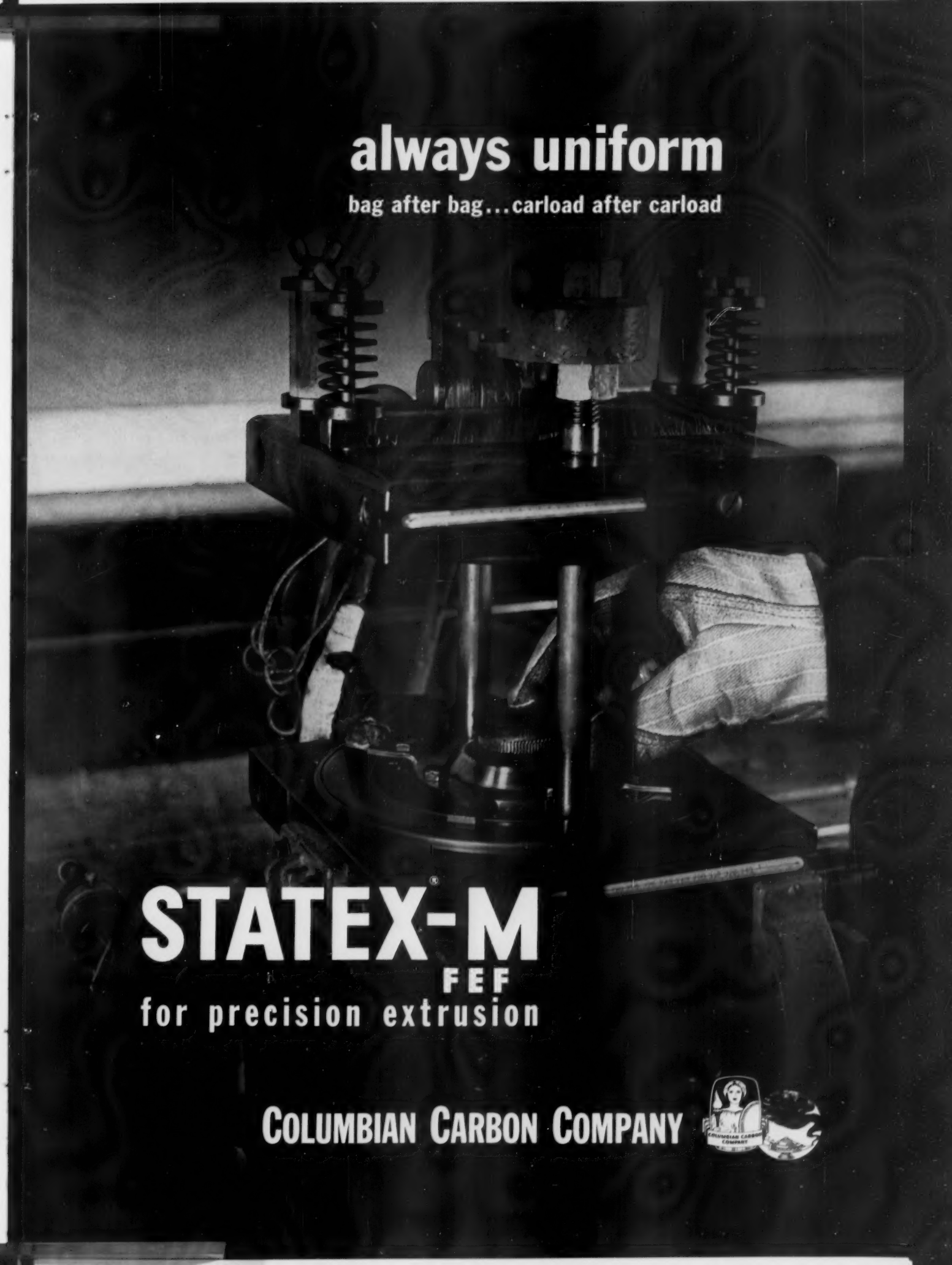
L. R. Jackson

R. C. Firestone

H. H. Hollinger

J. L. Cohill

E. H. Schulenberg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## ADVANCED COMPOUNDING COURSE OFFERED AT AKRON UNIVERSITY

Due to widespread demand, an advanced course in rubber compounding has been undertaken by the University of Akron in cooperation with the Akron Rubber Group. A sequel to an earlier series of lectures dealing with introductory matter, the advanced course, which began on January 14, has been offered because of the enthusiastic reception accorded the initial course and requests for more lectures on the subject. An "Introduction to Rubber Compounding," series of lectures by noted experts in the field, was initially presented in the Fall of 1955 and in the Spring and Fall semesters last year at Akron University. Coordinators were C. E. Carlson (General Tire), for the first two series and L. V. Cooper (Firestone), for the series last Fall.

Following a similar pattern, the advanced lectures will take place in fifteen successive weeks, beginning January 14 and concluding April 22, on Monday evenings from 8:15 p.m. to 10:15 p.m. in Knight Hall. A nominal fee of $10 per person is charged and the services of the lecturers donated. Technical in character, the lecture series was specifically designed for rubber compounders, but others who attended the introductory course were again invited to take part in the new series.

Mr. Carlson will again open the lecture series with an introduction to the subject. Succeeding speakers will be: Dr. Maurice Morton (Akron University); C. A. Ritchie (Goodrich); John W. Snyder (Columbian Carbon); Vic Vodra (Wooster Rubber); R. R. Radcliff (DuPont); Dr. T. H. Newby (Naugatuck Chemical); Raymond L. Fitz (Goodrich); W. F. Abbey (R. T. Vanderbilt); T. M. Kersker (Goodyear); Dr. Calvin Yoran (Brown Rubber); L. E. Oneacre (Cooper Tire); Earl F. Miller (Goodrich) and James Ferkes (Firestone).

### Consulting Firm Established

George T. Bayley and John B. Calkin have established a new firm of industrial consultants to be known as Calkin & Bayley, Inc., with offices located at 50 East 41st St., New York, N. Y. The firm will specialize in marketing and economic research, product and market development, process development and design, business and plant surveys, analysis and testing. Some of the industries to be served are the chemical, gas and petroleum, pulp and paper, packaging, textiles, plastics and agriculture. Officers of the corporation are John B. Calkin, president; George T. Bayley, executive vice-president; Robert Frank, vice-president in charge of marketing and economic research; Dr. John L. Parsons, vice-president in charge of pulp and paper.

Protective coatings containing Pliovic AO are currently being applied to light weight nylon tarpaulin fabrics by Sawyer-Tower, Inc., Watertown, Mass., to obtain suitable coating viscosity which results in greater economies in processing.

## AMERICAN HARD RUBBER ANNOUNCES PROMOTION OF TUTHILL AND POLLAK

Newton H. Tuthill

Budd E. Pollak

American Hard Rubber Co., New York, N. Y., has announced the appointment of Newton H. Tuthill, formerly executive vice-president and general manager of the Pequanoc Rubber Co., a wholly-owned subsidiary, as general manager of the Hard Rubber Division. He has been succeeded at Pequanoc by Budd E. Pollak. Mr. Tuthill was graduated from Norwich University in 1935 and the Harvard Graduate School of Business Administration in 1937 and joined American Hard Rubber in the same year. Since then he has held several positions in the organization. His career was interrupted temporarily during World War II, when he served in Africa and Europe as a major in the Air Force. Mr. Tuthill became executive vice-president and general manager of Pequanoc in 1953.

Mr. Pollak, who succeeds Mr. Tuthill as executive vice-president and general manager of Pequanoc, will retain his position as secretary of the parent company. He was graduated from Harvard University in 1932. Previous to service in the War Production Board and the U. S. Navy in World War II, Mr. Pollak was associated with J. W. Seligman & Co. and Union Securities Corp. in New York. He joined American Hard Rubber in 1946, and since 1949 has been secretary of the company. As head of Pequanoc, Mr. Pollak will have in his charge both the Butler, N. J. plant and the new plant now under construction in Tallapoosa, Ga.

### New Voit Rubber Officials

The formation of a new board of directors for the W. J. Voit Rubber Corp. of Los Angeles, Calif., has been announced by president Willard D. Voit. The Voit company, world's largest manufacturer of rubber and rubber-covered athletic equipment, was recently purchased by the American Machine & Foundry Co. of New York, N. Y. The new owners elected this board of directors: Morehead Patterson, president of AMF, chairman of the board; Rodney C. Gott, executive vice-president of AMF; Robert W. Kerr, vice-president of AMF; D. S. Meiklejohn, treasurer of AMF; H. P. Parker, executive vice-president of Voit, and president Voit. The new board of directors in turn elected the Voit company officers, headed by the promotion of G. D. Godfrey, former assistant to the president, to vice-president. Clarence J. Johnson of AMF has been named Voit assistant secretary. Messrs. Voit and Parker were elected president and vice-president, respectively. The other officers chosen were: Mell M. Barton and T. A. Kelly, vice-presidents in charge of sales; T. R. Edkins, secretary, and W. H. DeSellem, treasurer.

**What's going on abroad? Read "Overseas" by Reuter's. (See page 886.)**

### Opening New Thread Plant

Lloyd Manufacturing Co., Inc., Warwick, R. I., plans to open its new Extruding Division plant at Lafayette, R. I., in about mid-March. At the same time, the company will close down its Fall River, Mass., operations. Key personnel of the Fall River plant will be shifted to the new division, where opening employment will total between 12 and 15. Potential employment of 30 or 40 is anticipated in the future. Lloyd Manufacturing has leased a 16,000 square foot section of the Lafayette Mill for its Extruding Division and all new machinery will be installed. The division will be completely self sufficient as far as the manufacturing, shipping, etc., of extruded rubber thread is concerned. Cut thread production will continue at the firm's main plant in Warwick.

### Arrowhead-Federal Merger Set

With the approval of stockholders of both corporations, Arrowhead Rubber Co. of Downey, Calif., has been merged into Federal-Mogul-Bower Bearings, Inc. As of January 1, 1957, Arrowhead Rubber became known as the National Seal Division of Federal-Mogul-Bower Bearings, Inc. The new division will continue to operate exactly as in the past with identical personnel and policies.

## TWO SYNTHETIC RUBBERS ADDED TO NBS STANDARD SAMPLE LIST

The National Bureau of Standards has added two synthetic rubbers to its list of standard materials for rubber compounding. They are styrene-butadiene rubbers types 1000 and 1500, the first rubbers issued as standard samples. A total of 15 standard samples for rubber compounding (listed in the accompanying table), are now available from the Bureau. This series was initiated in 1948 at the request of the Office of Rubber Reserve, Reconstruction Finance Corp. It consisted originally of 7 compounding ingredients used in the quality control of synthetic rubber production. Later the American Society for Testing Materials Committee D-11 on Rubber and Rubberlike Materials requested the Bureau to prepare additional standard samples for use in testing and quality control of other raw materials. This committee also sponsored the establishment of one of the new standard samples, rubber type 1500.

NBS, in describing the two new synthetic rubber samples, states that type 1000 is polymerized at a temperature of 50°C. whereas 1500 is polymerized at 6°C. These rubbers are used as reference standards in the formulation given in ASTM Designation D15 and in specifications for synthetic rubbers. Designated as Standard Samples 386 and 387, they are available in bales of about 34 kg. (75 lb.) priced at $24.00 for the type 1000 and $27.00 for the type 1500.

The preparation of the standard samples for rubber compounding has necessitated the development of special laboratory processing and testing equipment. Special mill rolls were designed and constructed for maintaining uniform surface temperature during mixing of the rubber compound. The mold used for curing the rubber at NBS was machined directly into the hot plates of the vulcanizing press and controls were installed for keeping the temperature during vulcanization within 0.1°C. Improvements were also made in the Mooney viscometer and a strain tester was developed to attain the necessary test precision.

NBS Standard Samples for Rubber Compounding

| Number | Name | Approx. weight of sample in grams | Price per sample |
|---|---|---|---|
| 370 | Zinc oxide | 2000 | $ 2.15 |
| 371 | Sulfur | 1400 | 1.75 |
| 372 | Stearic acid | 600 | 1.90 |
| 373 | Benzothiazyl disulfide | 500 | 1.75 |
| 374 | Tetramethylthiuram disulfide | 500 | 3.50 |
| 375 | Channel black | 7500 | 3.50 |
| 376 | Light magnesia | 450 | 2.40 |
| 377 | Phenyl beta-naphthylamine | 600 | 4.00 |
| 378 | Oil furnace black | 7000 | 3.50 |
| 379 | Conducting black | 5500 | 3.50 |
| 380 | Calcium carbonate | 6000 | 2.50 |
| 381 | Calcium silicate | 4000 | 2.50 |
| 382 | Gas furnace black | 7500 | 3.50 |
| 386 | Styrene-butadiene rubber, type 1500 | 34000 | 27.00 |
| 387* | Styrene-butadiene rubber, type 1000 | 34000 | 23.00 |

* This sample is the remainder of reference rubber X-768 GR-S established in 1953 by the Federal Facilities Corp., Office of Synthetic Rubber.

### Acushnet Silicone Compounds

New heat resistant and low shrinkage compounds developed by the Acushnet Process Co. of New Bedford, Mass., are now available through the company's precision molding facilities. Higher service temperatures up to 600°F. for intermittent periods for molded silicone parts are now possible through the use of any one of the five new heat resistant types which range from 40 through 80 Shore A Hardness. The three Acushnet compounds in the 50 through 70 durometer range with low shrinkage characteristics now permit the holding of close tolerances in existing tooling originally designed for organic rubbers. Excellent low compression set characteristics are also available in the low shrinkage group.

Zinsser & Co., Inc., Cleveland, Ohio, has released a pamphlet describing the properties of "Pyrazell Red Toner 1D-1970" and "Pyrazine Orange Toner 2D-1955" as used in rubber, plastics and coatings.

### Bulk Liquid Transport Unit

The Department of the Army has announced that the Transportation Corps and the rubber industry are cooperating in experiments with a device called the "Rolling Fluid Transporter", an outsized rubber bag inflated with liquids, which may provide the first major improvement in transportation since the introduction of the steel drum. The transporter consists of a series of collapsible fabric reinforced rubber bags. Centered with axles and connected to a towing yoke, six can be towed on level ground by a conventional army jeep. When fully loaded, a transporter has a capacity of 500 gallons and weighs 4100 pounds. The transporter promises to meet requirements for rapid mobility and easier handling of bulk liquids and fuels, the Department of the Army states.

### Licenses Brazilian Firm

Phillips Petroleum Co., Bartlesville, Okla., has licensed Industrias Quimicas Eletro Cloro, S. A., Brazilian subsidiary of Solvay & Cie., to use the new Phillips developed catalytic process for making rigid polyethylene. The agreement grants Industrias Quimicas Eletro Cloro exclusive use in Brazil of Phillips patents and technical knowledge for producing the material. Solvay and Cie., the parent company, is headquartered in Brussels, Belgium and has been granted exclusive rights to use this process in Italy. Phillips is now starting operation of the first unit of its 110,000,000, pound a year plant to produce its new polyethylene at its Adams Terminal Chemical manufacturing site on the Houston Ship Channel.

### Nopco Forms Laboratory Unit

Nopco Chemical Co., Harrison, N. J., has announced the formation of a new laboratory unit, which will be operated under Dr. M. J. Kelley, director of Nopco's Industrial Specialties Laboratories, and chief chemist Henry R. Thompson. In the new unit, an accelerated program will be conducted to evaluate new chemicals as vinyl stabilizer components.

### Four New Goodyear Appointments

Goodyear Tire and Rubber Co., Akron, Ohio, has announced four promotions in the Industrial Products Division. Appointed to new posts are O. A. Schilling as sales manager; H. R. Comstock, assistant sales manager; R. E. Chapman, manager, Central region; and R. E. Mercer, manager of hose sales. Mr. Schilling, a native of St. Louis and an engineering student at the University of Missouri and Houston Tech, joined Goodyear in 1939. He was appointed manager of Industrial Products Departments in 1956. Mr. Comstock attended college at Kansas City, Mo. He joined Goodyear in 1929 as a tire salesman and became central sales manager in 1950. Mr. Chapman has served as manager of the Hose Sales Department since 1950. He studied general engineering at Iowa State before joining Goodyear's college graduate training program in 1935. Mr. Mercer joined the company in 1947 as a trainee after receiving an engineering degree from Yale University. He was appointed assistant manager of hose sales in 1953.

### Thiokol College Grants

Thiokol Chemical Corp., Trenton, N. J., in accordance with its policy of giving financial assistance to colleges, has awarded grants of $2,500 to Polytechnic Institute of Brooklyn, N.Y.; $1,500 to Drexel Institute of Technology, Philadelphia, Penna., and $1,000 to Rider College, Trenton, N. J. The same amounts were awarded to these colleges last year. Thiokol also maintains fellowships at Princeton University, Princeton, N. J., and Polytechnic Institute of Brooklyn.

### Rubber-Backed Fur Rug Patented

A fur rug, backed with two layers of rubber, has been patented by Edward Roberts of Detroit, Mich. U.S. Patent No. 2,776,233 consists of an outside layer of fur, preferably sheep, with its supporting skin, then an intermediate layer of sponge rubber and finally a backing of corrugated rubber to grip the floor.

## TALK ON BLACKS FEATURES ONTARIO SECTION MEETING

Approximately 110 members and guests of the Ontario Rubber Section of the Chemical Institute of Canada attended the January 8th meeting held at the Pickfair Restaurant in Mimico, Ont., Canada. The dinner was preceded by a cocktail party with the Columbian Carbon (Canada), Ltd., acting as host. Principal speaker at the meeting was Dr. C. W. Sweitzer, director of research and development of the Columbian Carbon Co. Dr. Sweitzer spoke on "Carbon Black Surface Chemistry and Rubber Reinforcement."

In his address, Dr. Sweitzer observed that whether the reinforcing action of carbon black is a physical or chemical phenomenon has been the subject of much debate, with adherents of first one and then the other view being predominant at various times. As is usual in such controversies the truth undoubtedly lies somewhere between the two extremes. Current investigations are gradually resolving the mystery of the chemical activity involved in reinforcement, with the recognition that the surface chemistry of carbon blacks plays a role far beyond cure effects in rubber vulcanizates.

Studies on the basic physical and chemical structure of the carbon black particle point to the presence of functional groups attached to the edges of the individual graphitic planes in the crystallites, which in turn constitute the building blocks of the carbon particle. These functional groups are composed of oxygen atoms linked to the surface through quinone or carbonyl linkages and hydroxyl groups. Infra-red and polarographic studies are gradually revealing the type and extent of these functional groups, the speaker declared.

### *Inhibiting Effects Cited*

Evidence of this chemical interaction between carbon black and rubber is provided by recently reported studies on the behavior of carbon black as an inhibitor of rubber oxidation. The effect of carbon black in inhibiting gelation and scission reactions in polymers is further evidence of this chemical interaction.

From the nature of the functional groups on the carbon particle surface possible mechanisms for this interaction were postulated which include addition of free radicals to the carbon black surface as well as reaction of the surface groups with unaltered molecules. Confirmation of this surface group activity was provided by tests in which the groups are removed or inactivated.

In summary, while chemical interaction of the carbon black surface with rubber molecules is not yet fully evaluated, it undoubtedly plays a substantial part in reinforcement. With a better understanding of this role, "we are convinced that improved control over the properties of the final vulcanizates will result," Dr. Sweitzer concluded.

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## VERNAY ANNOUNCES EXPANSION AND PROMOTION OF THREE EXECUTIVES

A. C. Hoffman

G. Asakawa

K. C. Tregillus

Vernay Laboratories, Inc., Yellow Springs, Ohio, has announced a $750,000 expansion program which includes construction of an additional plant that will more than double the company's productive capacity. The new plant will be located about a mile from the company's headquarters. At the same time, the company announced the appointment of A. C. Hoffman as executive vice-president, and George Asakawa and Kenneth C. Tregillus as vice-presidents. All three have been with the firm since its incorporation in 1946. Mr. Hoffman, a Yale graduate, has been vice-president and general manager of the company for several years. He was previously associated with United Aircraft Products Co., Dayton, Ohio, as chief engineer. Mr. Asakawa graduated from the California Institute of Technology in 1939 and served in the U. S. Army as a lieutenant during World War II. Mr. Asakawa has served as chief chemist in the Research Division of Vernay and will continue in that capacity. Mr. Tregillus attended Antioch College and as an undergraduate, he worked with Sergius Vernet, president of Vernay, on research as a part of the college's co-operative job program. After his graduation in 1940, he served as a synthetics technician with Nash-Kelvinator in Detroit, Mich., and later he returned to Yellow Springs to join Vernay. He has been and will continue as the company's chief chemist in the Synthetics Division.

### Manhattan Rubber Expanding

Raybestos-Manhattan, Inc., has announced plans for expanding the plant and facilities of its Manhattan Rubber Division at Neenah, Wisc. The expansion will cost about $250,000 and work is to start immediately. The expansion and other improvements will provide increased straight-line production capacity to better serve the roll covering requirements of the mid-west area. Although Manhattan has been rubber covering rolls at Neenah for 24 years, its paper roll covering experience extends back 64 years, from the beginning of modern paper making, at its parent operation at Passaic, N. J. Rolls are also rubber covered at its plant at North Charleston, S. C.

### C.I.C. Annual Meeting Planned

A large group of chemists and chemical engineers and others engaged in kindred activities are expected to attend the 40th Annual Conference of the Chemical Institute of Canada, to be held at the University of British Columbia, Vancouver, B. C., June 3, 4 and 5, 1957. A feature event of this conference will be the awarding of the Chemical Institute of Canada Medal for 1957, to H. G. Thode, principal, Hamilton College, and head, Department of Chemistry, McMaster University, Hamilton, Ont. This award is presented annually to a chemist or chemical engineer for outstanding contributions to the science of chemistry.

### Introduces New Golf Ball

U. S. Rubber Co., New York, N. Y., has introduced a new golf ball, designed to give the easy-swinging golfer faster get-away and longer distance. The new golf ball, called "U. S. Royal Seniors," is constructed to get maximum results for the easy-swinging golfer. Many week-end and after-work golfers have an easy swing and do not hit with the tremendous force of the tournament or hard-hitting golfer, the firm stated. For this group, the firm designed this special ball which will feel better off the club, have faster get-away and give greater distance. It will actually carry farther with a medium speed swing than a high tension wound ball. The golf ball has a liquid-silicone center, an extra hard-cured, pure rubber thread winding that is sensitive to even the lightest hit, and a tough new Cadwell cover, finished with a new X-55 paint that resists cuts and scrapes and washes up whiter. It is available with either the diamond or the dimple cover marking.

### Distributes Own Organic Colors

Federal Color Laboratories, Inc., Cincinnati, Ohio, which formerly distributed their organic colors to the rubber industry through the Monsanto Chemical Co., have established a sales force to market these products. Distribution of all products has been undertaken by Federal Color direct to the trade.

### Patents Available For Licensing

U. S. Department of Agriculture has announced that two patents have been assigned to the Secretary of Agriculture and are available for licensing on a royalty-free, non-exclusive basis. The first patent, U. S. Patent 2,775,578, "Polymerization Initiated by Saturated Cyclic Terpine Peroxides," was issued to Gordon S. Fisher and Dr. Leo A. Goldblatt on December 25, 1956. This patent covers the use of saturated terpene peroxides in polymerization processes. Para-menthane hydroperoxide and pinane hydroperoxides are mentioned specifically. Some claims in this patent cover the use of para-menthane peroxide in the production of synthetic rubber. It is believed that 700,000 tons of synthetic rubber manufactured for such uses as tire tread stock, etc., are produced annually, using para-menthane hydroperoxide as the polymerization catalyst. These peroxides are also finding use in the curing of polyester resins and it is estimated that the current production of saturated terpene hydroperoxides is in excess of 2 million pounds annually.

In this connection, U. S. Patent 2,735,-870 was issued to the same inventors in February, 1956, covering pinane hydroperoxide and methods for its production. This terpene peroxide can be made from turpentine from the three large sources by a simple two-step process. Allowance of the two broad patents resulted from an extensive research program on the oxidation of terpene hydrocarbons at the Naval Stores Station of the Southern Utilization Research Branch, Agricultural Research Service, U. S. Department of Agriculture, Olustee, Fla.

### General Tire Appoints Two

General Tire & Rubber Co., Akron, Ohio, has announced the promotion of R. W. Laundrie and L. E. Gressingh at the Chemical Division's Mogadore, Ohio plant. Mr. Laundrie was named technical superintendent, with over-all responsibility for the plant laboratory and the Process Engineering Department. Mr. Gressingh was appointed chief process engineer with direct responsibility for the functions and personnel of the process engineering department. Joining the company last year, Mr. Laundrie was assigned to the post of chief process engineer. Prior to his association with General Tire, he was employed at the University of Akron Government Laboratories. A native of Green Bay, Wisc., Mr. Laundrie received his bachelor of science degree from the University of Wisconsin in 1942.

Formerly process engineer for the Mogadore plant, Mr. Gressingh worked for Oerlikon Tool and Arms Corp. in Asheville, N. C. before joining General Tire last year. He has also been associated with American Cyanamid Co. and Koppers Co. A native of Cleveland, he studied at the Polytechnical University of Budapest, Hungary, earning his degree in chemical engineering.

Baldwin-Lima-Hamilton Corp. has completed transfer of the manufacturing and sales operations of its hydraulic and compacting press department from the Eddystone Division to the Hamilton Division.

### More News in Brief

A new truck tire valve chart, for drop-center rims, has been made available by the Dill Manufacturing Co., Cleveland, Ohio.

Chase Chemical Corp., Pittsburgh, Penna., has released a new 6-page folder describing its "Nafil" resin for making polyurethane foam. Copies are available on request to the company.

Solubility tables for coumarin, oldest of the synthetic aroma-fixing and odor-masking agents, are contained in new literature on the product published by the Monsanto Chemical Co., St. Louis 4, Mo.

An attractive 4-page brochure telling the story of "Paraflint", the new synthetic paraffin imported from South Africa, has been prepared and is available from Moore and Munger, New York, N. Y.

Polymer Corp., Ltd., Sarnia, Ont., Canada, and Dixon Chemical & Research, Ltd., Clifton, N. J., have joined the Manufacturing Chemists' Association.

The economical and reliable service provided by pipe made of Bakelite polyethylene is described in a new brochure published by the Bakelite Co., New York, N. Y. Copies are available from the concern.

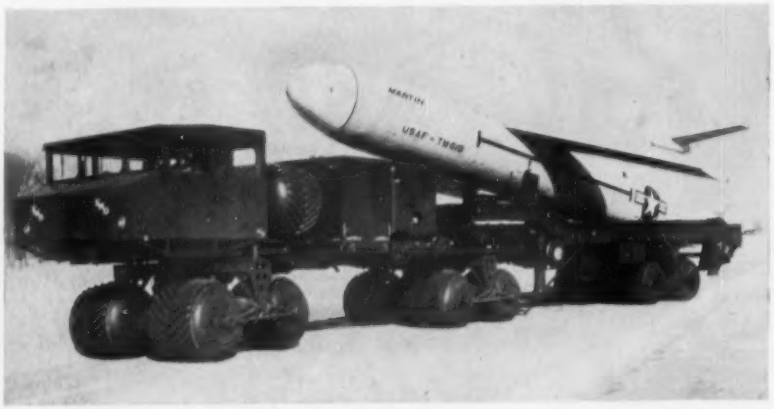
### Appointed to New Post

Promotion of William J. Esselstyn to manage organic intermediates and new product sales for the Chlorinated Products Division of the Diamond Alkali Co., Cleveland, Ohio, has been announced by L. J. Polite, Jr., divisional sales manager. At his newly-created position, Mr. Esselstyn will hold sales responsibility for Diamond chlorinated intermediates and related organic chemicals. He will also coordinate divisional technical service activities covering Diamond solvents and organic intermediates, and supervise bulk-terminal operations on these products. Mr. Esselstyn joined the Diamond organization as a chemist in 1947, and became a technical service representative in 1950. He was subsequently named sales promotion representative for solvents in the Chlorinated Products Division in March, 1954. A native of Lansing, Mich., Mr. Esselstyn in 1947 earned a B. S. degree at Otterbein College, Westerville, Ohio. He is a member of Sigma Zeta, national honorary science fraternity, and Sigma Delta, social fraternity.

### ASTM Standards Supplement

American Society for Testing Materials, 1916 Race St., Philadelphia 3, Penna., has announced publication of its 1956 Supplement to ASTM Standards. Of particular interest is Part 6, dealing with plastics, electrical insulation, rubber and electronics materials. Part 6 contains the revised standards and the new and revised tentatives on the aforementioned materials that have been accepted since the publication of the 1955 Book of ASTM Standards.

## U.S. AIR FORCE MISSILE LAUNCHER FEATURES GOODYEAR TERRA-TIRES



Shown above is the first actual photograph to be taken showing the U. S. Air Force's new "Pillow-tire" Teracruzer and Translauncher semi-trailer, with mounted TM-61B Matador missile. The Air Force unveiled the vehicles on January 21 at President Eisenhower's second Inaugural Parade. The eight-wheel-drive Teracruzer multi-purpose truck, made by the Four Wheel Drive Auto Co., and the Translauncher, built by the Goodyear Aircraft Corp., have huge high-flotation, low-pressure "Terra Tires" designed to blaze their own trail to off-road launching sites. The unique tires are made by the Aviation Products Division of the Goodyear Tire & Rubber Co. Production of the vehicles, which until now were experimental, has begun as part of multi-million dollar Air Force contracts for the new Matador ground support system developed by Goodyear Aircraft. All items of the missile ground-support system were developed for the Air Force's Air Research and Development Command, with the guidance of the Wright Air Development Center.

## AIEE MEETING FEATURES SYMPOSIUM ON POLYETHYLENE

The Winter General Meeting of the American Institute of Electrical Engineers held on January 21 to 25 in New York City featured a "Symposium on Polyethylene" at two special sessions in the morning and afternoon of January 22. The symposium was sponsored jointly by the Insulated Conductor Committee and the Committee on Dielectrics and included ten papers. The morning session of the symposium was devoted to papers on polyethylene, as such, and the afternoon session was devoted to the application of polyethylene to wire and cable.

The subjects covered by the papers presented at the symposium were discussed in some detail. It is planned to have the ten papers made available as a Special AIEE Publication. It is also intended that the discussions of these papers also be included in the Special Publication. The following papers were presented at the symposium:

"New Developments and Trends in Polyethylene Wire and Cable Insulation" by Alex E. Javits, *Electrical Manufacturing*.

"Thermal Embrittlement of the More Crystalline Polyethylene" by R. H. Carey, J. A. Snyder and H. C. Vakos, Bakelite Corp., Bound Brook, N. J.

"Polyethylene in Wire and Cable Use: Effects of Molecular Structure on Properties" by W. W. Spohn and H. J. Frey, Jr., Polychemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

"Irrathene Irradiated Polyethylene—A New Insulating Material for Wire and Cable" by E. J. Mackenzie, General Electric Co., Pittsfield, Mass.

"Impulse Breakdown of Electrically Prestressed Polyethylene" by C. R. Vail, Duke University, Durham, N. C., and W. F. Gauster, North Carolina State College, Raleigh, N. C.

"Applications of Polyethylene in the Wire and Cable Industry" by E. J. Merrill, Phelps Dodge Copper Products, Yonkers, N. Y.

"The Polyethylenes for Higher Voltage Cables" by R. C. Graham, Rome Cable Co., Rome, N. Y.

"The Use of Polyethylene Covered Conductor in the Niagara Mohawk System" by G. P. Adams and C. T. Nicholson, Niagara Mohawk Power Co., Buffalo, N. Y.

"Four Years of Experience With High Voltage Polyethylene Power Cables" G. Martin, P. Flouck, B. Schmidt, R. Goldschmidt, S. A. des Cabeleries et Trifileires, Switzerland. (Paper delivered by P. J. Croft, Canada Wire & Cable Co.).

"Resilient Shielding—A New Construction in Polyethylene Power Cable" by E. D. Eich, Anaconda Wire & Cable Co., Hastings-on-Hudson, N. Y.

### Larson Elected Vice-President

L. S. Larson, who was recently promoted to treasurer of the Standard Products Co., Cleveland, Ohio, has been elected financial vice-president as well. Mr. Larson has been associated with Standard Products for 12 years. Previously, he had been with General Motors for 17 years.

## HERMANN WEBER & CO. CELEBRATING FIFTIETH YEAR IN RUBBER INDUSTRY

H. Weber E. Feste S. Herring C. Wegmann

This year, Hermann Weber & Co. of 76 Beaver St., New York 5, N. Y., marks its fiftieth year of service to the rubber industry. The firm was founded in 1907 by Hermann Weber who previously had been associated with one of the largest scrap rubber companies in Europe. In 1920, Mr. Weber expanded his company's operations to include the export of scrap rubber. In 1928, it was decided to expand to other lines and the company undertook the importation of crude rubber. Later, the firm became engaged in the import of balata, gutta percha and gums for the chewing gum industry. At this time, the company also became engaged in the precipitation of balata and gutta percha for the golf ball industry. During World War II, large quantities of precipitated balata were produced for the manufacture of self-sealing fuel tanks.

Today, Hermann Weber & Co. operates the Ramco Trading Corp. and the Banta Corp., both of which are engaged in the import and export of manufactured articles. Ramco is particularly active in the sole crepe field and in new gums for chewing gum manufacturers. The company recently associated itself with Mohawk Industries, manufacturers of chemicals and resins for the rubber and other industries. Hermann Weber is president of the company bearing his name and Edwin R. Feste is vice-president. Stanley Herring is serving as treasurer, while Charles E. Wegmann is manager of the Balata Department. Mr. Herring is also president of Rainco, while Mr. Feste is vice-president.

### British Plastics Exhibition

The International British Plastics Exhibition has been scheduled for July 10-20, 1957, at the Grand and National Halls, Olympia, London. Participants from eight countries, and perhaps more, plan to display their products at the show. These countries include Great Britain, the United States, Germany, Switzerland, Sweden, Italy, France and Holland. A limited amount of first floor stand space at the exhibition halls, which was recently ballotted off at the British Plastics Federation Headquarters in Piccadilly, is still available. Manufacturers who wish to participate should apply to John L. Wood, British Plastics Exhibition, Dorset House, Stamford Street, London, S. E. 1, Great Britain. The exhibition is organized, with the cooperation of the British Plastics Federation, by British Plastics.

### Chase Chemical Appoints Ashley

Chase Chemical Corp., Pittsburgh, Penna., has announced the appointment of T. C. Ashley & Co., Inc., Boston, Mass., as exclusive representative in New England. This area has been served by Ashley since 1872. The company will sell Chase naphthenate and tallate paint driers and Chase's new line of polyisocyanate resins for urethane foams.

Claremont Pigment and Dispersion Corp., L. I., N. Y., has announced the development of the "VC" series gravure vinyl ink concentrates for printing on vinyl film and sheeting, and the "4000" series, color paste concentrates for coloring polyester resins.

### Allen Clapp Assumes Presidency

Allen N. Clapp, associated with the New Jersey Rubber Co., Taunton, Mass., since his graduation from Yale University in 1950, has been named president of the company succeeding his father, John S. Clapp, who has been named chairman of the board. A vacancy in the latter position was created by the retirement of George A. Clapp late in 1956. Eugene H. Clapp serves as treasurer of the concern. For the past several years, Mr. Allen Clapp has been executive vice-president and general manager of New Jersey Rubber. Mr. John Clapp had served as company president for many years. New Jersey Rubber was established in New Jersey in 1890, and in 1933 began operating its present manufacturing facilities in Taunton, Mass. The company specializes in the manufacture of heels and soles and allied products for the shoe industry.

### Nopco Chemical Appointments

Plastics Division of the Nopco Chemical Co., which is presently moving into its new plant in North Arlington, N. J., has appointed R. W. Ward, formerly Nopco plant engineer, to take charge of all engineering and production. Harry Marx will be responsible for urethane foam production, under Mr. Ward. Harry Rogers, who was in charge of production during the initial phases of setting up the operation, will take over responsibility for Nopco's flexible foam development program, under Dr. B. A. Dombrow, director of the Plastics Laboratories.

### Heads Firestone International

W. D. Waugh has been appointed president of the Firestone International Co. succeeding Samuel Broers who retired on January 1 after 40 years with the company. The promotion of W. E. Kemerer to vice-president of Firestone International was also announced. Mr. Waugh has been managing director of the company's Port Elizabeth, South Africa, subsidiary since September, 1942. He arrived in Akron in late January to assume his new duties. Mr. Waugh attended Ohio Wesleyan University and began his career at Firestone in 1927 as a timekeeper. He later held positions in the office manager's auditing and accounting departments. He was transferred to the company's Port Elizabeth plant in 1936 as comptroller, and became managing director six years later.

Mr. Broers, a native of Holland, joined the firm in 1914 and in 1919 became Firestone's first European sales representative. In 1922 he was called back to Akron to reorganize the company's export department. During the time Mr. Broers directed the company's overseas operations, 11 plants were put into operation in foreign countries.

Mr. Kemerer joined Firestone in 1929 and went to India in 1931. He served in the Army during World War II and after the war became assistant managing director of Firestone New Zealand. He has been in charge of export trade in Akron since 1953.

### Reclaimers Re-Elect Officers

At its annual meeting held on February 4 in New York City, the Rubber Reclaimers Association, Inc., announced the re-election of all officers including: *President*, C. H. Peterson (U. S. Rubber Reclaiming), *Vice-President*, Henry L. Dixon (Goodrich); *Secretary-Treasurer*, C. T. Jansen (RUBBER AGE). G. K. Trimble (Midwest Rubber Reclaiming) will serve as chairman of the Association's Executive Committee. T. H. Fitzgerald (Naugatuck Chemical) has been appointed chairman of a newly-organized Educational Committee. This new committee will work with the various rubber groups which are presenting courses in rubber technology. Mr. Fitzgerald's committee will also work closely with the program chairmen of the rubber groups to furnish technical speakers.

### Weber Appointed Vice-President

Dr. Ernst Weber has been appointed to the newly created position of vice-president of research at the Polytechnic Institute of Brooklyn. According to Dr. Harry S. Rogers, president of Brooklyn Polytechnic, creation of the post had been made necessary by the growth of research projects at the institute, which now represent annual expenditures of more than $2,250,000. A native of Vienna, Dr. Weber went to Polytechnic in 1930 as a visiting professor. He has been head of the department of electrical engineering and director of the Microwave Research Institute at Polytechnic since 1945.

**Have some comments to make? Write a letter to the editor! (See page 760).**

### Surveys GR-S Type Polymers

The Bureau of Ships of the Department of the Navy, Washington 25, D.C., recently conducted a survey of polymer manufacturers to determine the availability status of GR-S type polymers currently meeting Federal Standard No. 90 requirements. Federal Standard No. 90 was issued in April, 1956, to describe the butadiene-styrene and isobutylene-isoprene polymers originally marked by the Office of Synthetic Rubber of the Reconstruction Finance Corporation. Since the Office of Synthetic Rubbers has been discontinued, it is thought advisable that Department of Defense Agencies maintain current information and for this reason the Bureau of Ships survey was undertaken. Copies of this survey are available from the Bureau of Ships. Any suggestions or comments in regard to the list should be addressed to T. A. Werkentin, Head, Elastomers Section, Research and Development Division, Bureau of Ships, Department of the Navy, Washington 25, D.C.

### Polylite Antioxidant-Stabilizer

"Polylite," a strong, general-purpose antioxidant which also finds use as a stabilizer, has been introduced by the Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn. Polylite is a strong secondary amine type antioxidant in natural and synthetic rubber. It is strongly related to "Octamine" in chemical structure and may be considered a liquid form of Octamine. It has the same general broad protective action with the same minimum amount of discoloration and staining, a combination of properties not usually found in such amine type chemicals, the company states. Polylite, because it is liquid and readily emulsifiable, is primarily recommended for use as an antioxidant and stabilizer in the manufacture of GR-S and similar polymers and as an antioxidant in latex compounding.

### Beacon Products Availability

Beacon Chemical Industries, Inc., Cambridge, Mass., has announced the availability of three products of interest to the rubber industry. The first of these, "Degell", is a processing agent which acts as a plasticizer, softener and viscosity reducing agent. It aids in the manufacture of uniform quality compounds and helps to prevent loss from scorching by lowering the working temperature of the compound. Degell is said to permit higher solids content for a given viscosity and a lower viscosity for a given solids content in cements. It may be used satisfactorily with natural, synthetic and reclaimed rubber compounds. Beacon Chemicals ammonium stearate finds use in a variety of water-repellent coatings. It may be dispersed in water and applied by dipping, spraying, brushing, etc. This product is available in two concentrations: 10 per cent anhydrous and 28 per cent anhydrous. Other concentrations are available on a specific order. The company also has available zinc stearate which finds use as a dusting agent and mold lubricant. A fluffy white powder, this product has a specific gravity of 1.09 and is available in 25 pound paper bags and 50 pound cartons.

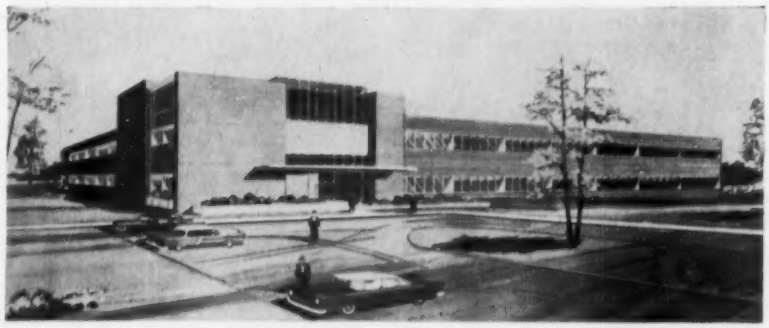
### Named Executive Vice-President

Sawyer-Tower, Inc., Boston, Mass., has announced the promotion of William A. Reilly to executive vice-president. Sawyer and Tower, two of the oldest protective clothing manufacturers in the country, were merged a year ago, and Mr. Reilly played a prominent part in the consolidation of the two firms.

### Grove Merger Official

On December 31, 1956, Grove Valve and Regulator Co. became the successor, by merger, of Grove Controls, Inc. All future business will be handled in the name of the successor company at 6529 Hollis Street, Oakland 8, Calif.

## ARCHITECT'S CONCEPTION OF NEW ATLAS POWDER TECHNICAL CENTER



Atlas Powder Co., Wilmington, Del., has announced that ground has been broken for the construction of a $3,000,000 Technical Center adjacent to the company's general offices. The Technical Center, which will enable the company to intensify its long-range research program and expand its technical service to the rubber industry, is scheduled for completion by the end of this year. This is the latest step in the current expansion of the Atlas research and development program. Plans are to approximately double the company's research and development strength within the next few years. The center will provide extensive facilities for work across the entire range of applications served by Atlas products. The building is designed to provide working space for about 200 Atlas Powder employees.

## PHILADELPHIA ELECTS OFFICERS; HEARS ADDRESS BY S. D. GEHMAN

The January 25th meeting of the Philadelphia Rubber Group held at the Poor Richard Club in Philadelphia, Penna., featured an election of officers for the 1957 season and a paper on "Gamma Radiation and the Rubber Industry" by Dr. S. D. Gehman, Head, Physics and Electronics Section of the Research Division, Goodyear Tire & Rubber Co. The following members have been elected to office:

*Chairman*, J. R. Mills (Goodall Rubber); *Vice-Chairman*, R. A. Garrett (Armstrong Cork); *Secretary-Treasurer*, R. S. Graff (DuPont). H. M. Sellers (Lee Tire) and G. N. McNamara (Pequanoc Rubber) were elected directors.

In accordance with a system introduced at the November, 1956, meeting, cash draw prizes were awarded at the technical meeting. The first, second, and third prizes were won by G. E. Grove (N. J. Zinc), T. J. Glennon (H. M. Royal), and J. W. Conyers (Sharples Chemicals), respectively.

In his talk, Dr. Gehman stated that practical interest in application of intense molecular radiation spring from the long range expectations for atomic energy. It is anticipated that atomic power generation will grow in an evolutionary way with the expansion of the total economy. Forecasts indicate that by 1980, electrical atomic power may be equivalent to the total power generation of today, he said. This will involve a stupendous, unprecedented production of radiation and radioactive by-product material.

### *Radiation for Industrial Use*

Radiation for industrial processing might be made available by special arangements directly as it is produced at a reactor; or spent fuel elements could be removed from the reactors and used as sources of radiation; or the radioactive fission products could be separated from the spent fuel elements. Cs 137 and Co 60 are the isotopes of most interest for strong gamma ray sources. Gamma rays of this energy interact only with the electronic structures of atoms, not the nucleus, so that chemical and physical effects occur but no radioactivity is induced.

Results which have been obtained with effects of intense radiation on materials and chemical reactions, Dr. Gehman noted, have been sufficiently encouraging to lead to expanding programs of research and exploration at universities, research institutes and industrial laboratories. Unusual techniques and procedures which revolve mainly around safety considerations are involved in this work.

The new Goodyear radiation research laboratory is outstanding in the flexibility of the arrangements with its 2100 curie source of Co 60. The "cave" housing the source has 4-foot thick concrete walls and a 17-foot deep, aluminum-lined waterfilled well for storing the source. The water provides sufficient shielding so that test specimens or chemical equipment can be set up and arranged for irradiation. After the operator leaves the cave, the source is brought up on an elevator to perform the irradiations. The safety precautions are elaborate, the speaker stated.

The effects of high intensity gamma radiation of most interest for the rubber industry arise from the way in which the energy is dissipated in organic compounds to result in chemical reactions. A wide, new field for polymerization research is opened up in which radiation can do things which cannot be accomplished by usual chemical means. Radiation graft polymers are especially interesting. Effects on solid polymers are complex and, depending upon the structure, crosslinking or degradation may predominate. Most types of raw rubber can be crosslinked or vulcanized without the assistance of heat or chemicals although the radiation dose required is rather large. The physical properties of some plastics can be favorably affected by radiation, he declared. This new field of research has many ramifications pertinent to the rubber industry, Dr. Gehman concluded.

## LANDERS CORP. ANNOUNCES SEVERAL EXECUTIVE STAFF APPOINTMENTS

Robert G. Landers

John P. Howland

At a recent meeting of the board of directors of Landers Corp., Toledo, Ohio, Robert G. Landers was elected board chairman, John P. Howland, president; John C. Siegmann, executive vice-president and treasurer and Timothy Y. Hewlett, Jr., secretary. Mr. Landers has served as president and general manager of the company since 1930, following the death of his father, Ralph A. Landers, founder of the firm. He started with the company in 1919, working after school and during summer vacations. After he was graduated from Harvard College in 1928, he joined the firm full-time in purchasing, sales and advertising capacities. Mr. Howland, also a graduate of Harvard College, joined Landers in 1940. Previously, he had been associated with Guaranty Trust Co. and the Commercial National Bank and Trust Co. in New York City. He was elected secretary of the firm in 1944 and executive vice-president in 1954.

Mr. Siegmann recently celebrated his 30th year with Landers. He started with the company in 1926 as a baler in the factory and later became an office boy. Progressively, he was put in charge of accounts receivable, bookkeeping and inventory control and he installed the first cost accounting system for the company. He was elected assistant treasurer in 1935, made general purchasing agent in 1941, elected a director in 1949, vice-president in 1952 and secretary-treasurer in 1954, a post he held until his election as executive vice-president. Mr. Hewlett, a native of Toledo, began management training with the company in 1954 and was subsequently named assistant purchasing agent. Recently, he has been serving as assistant secretary and general purchasing agent. Before joining Landers, he was with the Harris-Seybold Co. and Owens-Corning Fiberglas Corp. Mr. Hewlett is a graduate of Dartmouth College.

### ASTM Textile Materials Standards

The latest tentatives and standard methods of tests, specifications, and definitions pertaining to textile materials are included in the "ASTM Standards on Textile Materials" which was prepared by Committee D-13 on Textile Materials, American Society for Testing Materials. Of the 126 standards and tentatives, 21 are new and 8 were revised since the previous edition. Fourteen appendices cover 13 proposed recommended practices, methods of test and specifications as well as a table of the Basic Properties of Textile Fibers, Psychometric Table for Relative Humidity, and the Yarn Number Conversion Table. Copies may be purchased from ASTM at 1916 Race St., Philadelphia 3, Penna., at $6.25 per copy.

**What's going on abroad? Read "Overseas" by Reuter's. (See page 886.)**

### URW Criticizes Plant Closing

L. S. Buckmaster, international president of the United Rubber Workers (URW), in a letter to E. M. Cushing, director of industrial relations of the U. S. Rubber Co., criticized the proposed closing of the company's Washington, Ind., plant. On November 9, the company advised employees at the Washington plant that operations would be suspended because the plant was at a competitive disadvantage. In response, members of Local 337 voted, on December 21, to accept a 25c hourly pay cut. The company subsequently announced that it would continue plant operations. The matter was reviewed by the URW policy committee on January 5. The committee, Mr. Buckmaster said, "took action to follow the contract . . . by reopening the general wage scale for negotiation." According to the union executive, U. S. Rubber "did not follow the contract covered by reopening wages for negotiation." "Instead," he added, "it convinced the union membership at Washington that there would be no jobs for them unless they accepted a 25c per hour reduction, effective January 14." President H. E. Humphreys of U. S. Rubber, said the company was closing down its Washington plant because "the international union and its policy committee are pressing the accusation that the company will be in violation of its company-wide union agreement if the wage cut is put into effect."

### Expands Para-Cresol Facilities

Hercules Powder Co., Wilmington, Del., has announced that the first unit of an extensive para-cresol expansion program at its Gibbstown, N. J. plant is now on stream. The new facility is capable of producing several million pounds of para-cresol annually. An additional unit, of about the same capacity, is presently under construction. Facilities for conversion of the para-cresol to di-tert-butyl-para-cresol will be produced. The Gibbstown plant, into which the para-cresol and di-tert-butyl-para-cresol addition is integrated, is one of the chemical industry's most modern oxychemicals plants and has been in operation for about two years. The plant utilizes a unique process, pioneered and developed by Hercules to produce phenol, acetone and related products as well as para-cresol.

### Local 186 Plans Community Store

According to current reports, Local 186 of United Rubber Workers of America consisting of some 3300 employees of the Firestone Tire & Rubber Co. at Memphis, Tenn., has contracted to build a $200,000 retail department store to serve its members. The store, which will be known as "Consumer's Service Store", will be located west of the union's present office building on Firestone Boulevard. Owned and operated by the Local 186 Building Association, Inc., the 100 by 60 foot store will be connected by a wide canopy over a driveway to the parent URWA building which was completed 2½ years ago. It will be veneered in matching buff brick, its contemporary design conforming to that of the existing building.

### Buys Wire And Cable Business

Kaiser Aluminum and Chemical Corp., Oakland, Calif., has announced the purchase, for an undisclosed amount of cash, of the wire and cable business of the U. S. Rubber Co. Industry sources outside the two companies estimated the sale price at between $6,000,000 and $7,000,000. Included in the transaction is U. S. Rubber's insulated wire and cable plant at Bristol, R. I., and its wire and cable inventories. Kaiser Aluminum also will absorb the nation-wide wire and cable sales organization and distribution network of U. S. Rubber. The 1,400 employees of the Bristol plant will be transferred to the Kaiser payroll. Current plans are to continue service without interruption to existing wire and cable customers and to maintain the same channels of distribution. Spokesmen of U. S. Rubber said the company had been considering getting out of the wire and cable business for some time. The firm plans, however, to continue to supply the rubber used for wire insulation at the Bristol plant. The plant, on an eighteen-acre site about fifteen miles south of Providence, R. I., was built during the Civil War and has been operated as a wire and cable facility by U. S. Rubber since 1892.

### New Ethylene Oxide Plant

Plans are underway for the construction of an $11,000,000 petrochemical plant at Lake Charles, La., that will produce ethylene oxide and ethylene glycol, using ethylene supplied by Petroleum Chemicals, Inc. The new plant, which will be capable of producing eight million gallons of ethylene glycol annually, will be engineered, built and operated for the Calcasieu Chemical Corp. by Petroleum Chemicals. Completion is expected early in 1958. The new plant will be located immediately adjacent to the ethylene plant now under construction by Petroleum Chemicals, which will obtain the refinery gases, used as a raw material, from the adjacent petroleum refineries of the Continental Oil Co., and the Cities Service Co., joint owners of Petroleum Chemicals. The new plant will operate under a license from the Shell Development Co.

"Jones insists on testing each pool himself!"

### Goodyear Executives Retire

As a result of a compulsory retirement program which went into effect in May, 1955, the Goodyear Tire & Rubber Co., Akron, Ohio, has announced the following retirements effective January 31, 1957: Walter Hazlett, vice-president on special assignments, who has been with the company for 50 years—for 17 years he was managing director of Goodyear's plant in England; Joseph E. Mayl, vice-president of the General Products Group with 32 years of service; A. G. Cameron, vice-president of the Goodyear Tire & Rubber Export Co. and Goodyear Foreign Operations, Inc., 43 years' service; S. A. Steere, vice-president of Goodyear Textile Mills; Dr. Karl Arnstein, vice-president in charge of engineering for the Goodyear Aircraft Corp.; Harry J. Carroll, general traffic manager with 47 years' service; John J. Blandin, manager of the Crude Rubber Division, 45 years' service; William J. McCauley, assistant general traffic manager, 34 years' service; Arthur C. Horrocks, public relations counsel with 30 years' service; H. L. Matti, Safety Department, Tire Division, and for 21 years foreman and general manager of Goodyear's Production Training Squadron.

### FTC Opens Firestone Hearings

The Federal Trade Commission has opened a hearing on its complaint that the Firestone Tire & Rubber Co. and the Shell Oil Co. illegally agreed to push Firestone products through the latter company's service stations. A similar case involving the B. F. Goodrich Co. and the Texas Co. opened last fall in Washington, D. C., and similar proceedings will soon begin against the Goodyear Tire & Rubber Co. and the Atlantic Refining Co. FTC contends that the rubber companies paid the oil companies to sell their brands of tires, batteries and accessories. The rubber companies concede that they paid the commissions, but call them legitimate "sales assistance" payments. The FTC examiner hearing the cases has to decide whether the oil companies merely "push" the rubber company products, or whether these products are forced upon service station owners.

### Cited For Excellent Management

American Institute of Management, New York, N. Y., has announced that U. S. Rubber, Goodyear, Firestone and Goodrich have won the rating of Excellent Management for 1956. Companies are rated by AIM on every function of management and not just on profits. There are ten basic categories of management performance used by the Institute to study Canadian and American business. The companies are studied from the point of view of their economic justification as well as their treatment of shareholders, customers and the public. Their capital structure as well as the customary figures are closely scrutinized, but the greatest weight is given to the evaluation of the executive team.

**Have some comments to make? Write a letter to the editor! (See page 760).**

### Cary Elected Vice-President

Beecher B. Cary

Election of Beecher B. Cary as vice-president of engineering and research for the Standard Products Co., Cleveland, Ohio, has been announced by Dr. J. S. Reid, president. Mr. Cary joined Standard Products in 1951 as director of engineering and research. All engineering, research and devolpment work for the company's six manufacturing divisions was centralized under his direction, with new laboratory facilities built at Cleveland and Port Clinton, Ohio. Engineering and research projects carried out under his guidance at these laboratories have included development of the automobile safety lock, the first electrostatically flocked window seals for automobiles, new rubber curing and molding processes, and what is said to be the world's first continuous flow window channel production line. Mr. Cary formerly was vice-president in charge of engineering and a director of Hayes Industries, of Jackson, Mich., and was graduated from the University of Michigan in 1930 with a degree in aeronautical engineering.

### New Dayton Trailer Tire

Dayton Rubber Co., Dayton, Ohio, has introduced a new, medium height tubeless tire, known as the "Thorobred Mobile Home Low Boy". The 7.00 x 14.5 tire has high load capacity and reduces tire height to 3.2 inches less than the conventional 7.00 x 15 size. Like the 10-inch Low-Boy introduced early in 1956, which reduces tire height more than five inches, the new tire eliminates wheel housings for greater flexibility in interior design. The company also produces the conventional 7.00 x 15 size in tubeless and tube-type. The greater load carrying capacity of this new tire accommodates heavier and wider coaches, the company says.

### Appointed Research Director

Norman D. Spilker, formerly chief chemist, has been appointed director of research at the American Container Corp., Huntington, West Va. Before joining American Container in 1948, he was employed by the Midwest Rubber Reclaiming Co., East St. Louis, Ill. He holds a masters degree in chemical engineering from Washington University, St. Louis, Mo.

### U. S. Rubber Expanding Belt Plant

U. S. Rubber Co., New York, N. Y., has announced that ground has been broken for the construction of a 45,000 square foot building to provide additional manufacturing, warehouse and office space for its power transmission belt plant in the Tacony area of Philadelphia, Penna. The new building, a 180-foot wide and 253-foot deep steel-framed masonry structure, will adjoin the present plant. The unit, scheduled for completion this June, was designed to provide additional space for the manufacture of Gilmer Timing Belt, and to provide increased warehousing facilities to permit faster and better customer service. The warehouse section of the new plant building will be linked to the existing plant with a conveyor, by which finished belts will move from production lines to the warehouse. The warehouse section will have other modern materials handling equipment and a loading dock for truck shipments. This construction is part of a continuing program of modernization and expansion which was started in 1948, the company says.

### Offers Resiweld Bonding Agents

H. B. Fuller Co., St. Paul, Minn., has developed five new high strength, permanent bonding agents, named the "Resiweld Plastic Alloys". Said to assure durable, impact resistance bonds to practically all metals, plastics, wood, glass, concrete and other surfaces, Resiweld Plastic Alloys form permanent bonds that replace other fastening methods such as welding, soldering, riveting and bolting. According to the company, these alloys have the property of resistance to sag or flow and are, therefore, exceptionally suitable for filling cracks, sealing, patching, caulking seams and other applications where a heavy build-up of material is necessary.

## FINANCIAL BRIEFS

Directors of the Brunswick-Balke-Collender Co. have authorized the issuance of $5,800,000 of new convertible subordinated debentures to be offered to company shareholders for subscription on the basis of one $100 debenture for each nine shares of common stock held. The purpose of the issue is to help finance continued growth of the company, which has not done any long-term financing since 1924.

Stephen A. Wilson, vice-president of the Okonite Co., has acquired 637 common shares through a stock option, making his direct holdings that amount.

Dayton Rubber Co. has placed in registration with the Securities and Exchange Commission $5 million of convertible subordinated debentures. Proceeds from the sale would be available to finance increased inventory requirements and for other corporate purposes.

James H. Hoffman, president of the Mansfield Tire & Rubber Co., has made a gift of 700 common shares, reducing his direct ownership to 29,737.

### Enjay Promotes Taylor

Gavin A. Taylor

Enjay Co. Inc., New York, N. Y., has appointed Gavin A. Taylor assistant sales manager of the company's Butyl Division. A native of Maynard, Mass., Mr. Taylor attended Tufts College and later became associated with the Hood Rubber Co. at Watertown, Mass. In 1945, he joined Enjay and was assigned to foreign sales work until 1952. Later he worked on new product development and last July, he was transferred to the Butyl Division. He is a member of the 25-Year Club in the Rubber Division of the American Chemical Society.

### CCDA Annual Meeting Scheduled

The Annual Open Meeting of the Commercial Chemical Development Association has been scheduled to be held at the Hotel Statler in New York City on March 28, 1957. Topic of the meeting will be "The Plastics Industry". At present, plans are to have a number of well known leaders in the plastics industry speak at the morning session. Panel discussions dealing with various problems and requirements of the plastics manufacturer, fabricator, distributor and consumer are scheduled for the afternoon session. A talk, to be given by the recipient of the CCDA award, which is presented annually in recognition of outstanding achievement in the commercial chemical development field, will be the feature of the evening banquet.

### Kenflex A Neoprene Plasticizer

According to the Kenrich Corp., Maspeth, N. Y., "Kenflex A", a polymeric plasticizer for neoprene, has demonstrated its usefulness as a plasticizer and processing aid. The use of the product brings about definite control over heat build-up during milling, resulting in freedom from scorch. Kenflex also has a pronounced effect on the stress relaxation of neoprene, which accounts in part for the improvement in ozone resistance. Recent data shows a pronounced effect on the control of crystallization of type W Neoprene. Retention of tensile strength and elongation after heat aging is greatly improved Kenrich states. This data is available upon request from the Kenrich Corp., 57-02—48 St., Maspeth, N. Y.

# Names in the News

**Dr. Clarence A. Stiegman** has been named director of product development of Hooker Electrochemical Co., Niagara Falls, N. Y., to direct product development of both the chemical and plastics elements of the company's business.

**George F. Pryor,** vice-president of the Cleveland Trust Co., has been elected a member of the board of directors of the Sun Rubber Co., Barberton, Ohio, to fill the unexpired term of the late Joseph L. McLane.

**J. L. Rodgers** has been named manager of the Molding and Extrusion Materials Department of the Bakelite Co.; A. F. Sward, manager of the Bonding Materials Department and J. B. Knowles, manager of the Consumer Products Department.

**Dr. B. D. Thomas** has been appointed director of the Battelle Memorial Institute, Columbus, Ohio, succeeding Dr. Clyde Williams. Dr. Thomas has been with Battelle since 1934.

**Ray Edward Bolin, Jr.,** research chemist in the Technical Service Department of Mobay Chemical Co., St. Louis, Mo., is spending six months at the plant laboratories of Farbenfabriken-Bayer, A. G., Leverkusen, Germany, for training in urethane foam technology.

**H. E. Humphreys, Jr.,** chairman and president of U. S. Rubber Co., has received a special citation from Keep America Beautiful, Inc., for his "volunteer service" in the nationwide educational program to prevent littering.

**J. W. McLaughlin** has been promoted from assistant manager to manager of the Film and Sheeting Division of the Bakelite Co.

**Joseph C. Hofmann, Jr.,** formerly assistant manager of retread and repair materials, has been appointed manager of retread and repair materials for Goodyear Tire & Rubber Co., Akron, Ohio.

**H. R. Godfrey, Jr.,** has been appointed manager of product sales in the West-Allis Centrifugal Pump Department of Allis-Chalmers Manufacturing Co., Milwaukee, Wisc.

**Robert E. Blackmore** has been appointed technical sales representative for Rubber & Asbestos Corp., with headquarters in Berwyn, Ill.

**Fred C. Foy,** president of the Koppers Co., Inc., has been elected to the board of directors of H. K. Porter Co., Inc.

**Aiden R. Ludlow, Jr.,** formerly manager of alcohol sales, has been named director of sales for U. S. Industrial Chemicals Co., succeeding Lee A. Keane, who has retired.

**John C. MacFarlane,** previously assistant treasurer and vice-president in charge of sales, has been elected president of Youngs Rubber Co., New York, N. Y.

**Donald L. Dewing,** former manager of quality assurance at Aerojet-General Corp., has been appointed director of quality control for the General Tire & Rubber Co.

**Edwin Stein,** chairman of the board of Stein, Hall & Co., Inc., was honored on December 12th at a testimonial dinner in celebration of his 40th year with the company.

**Randolph H. Jackson,** formerly vice-president of the Clinch-Tite Division of Payson & Trask, has been appointed director of sales for the Boston Woven Hose and Rubber Co.

**Carl J. Tsaloff** has been promoted from production superintendent of the Aeronautical Division to Akron plant manager for B. F. Goodrich Aviation Products.

**William A. Mitchell,** president of Central Trust Co., Cincinnati, Ohio, has been elected to the board of directors of National Starch Products, Inc., New York, N. Y.

**Dr. Anthony J. Urbanic** has been appointed assistant director for material development for the General Tire & Rubber Co.

**Samuel Hochberger,** vice-president and manager of the Dock & Warehouse Department of Stein, Hall & Co., Inc., was recently honored at a testimonial dinner to celebrate his 45th year with the company.

**James W. Jenkins,** of Jenkins Rubber and Plastics, Red Bank, N. J., completed his 20th year in the rubber industry in January.

**George P. Bosomworth** of the Firestone Tire & Rubber Co., has been elected to the grade of Fellow in the Institute of Radio Engineers "for contributions to the use of electronics in the rubber industry".

**Bruce M. Bare,** formerly marketing manager of the Organic Chemicals Division of Dewey and Almy Chemical Co., has been appointed marketing manager of the Chemicals Division of Atlas Powder Co.

**Parrvyn R. Lawson** has been placed in charge of the Racing Tire Division of Goodyear Tire and Rubber Co., succeeding Harry Goodenberger, who has been appointed assistant manager of the company's Auto Tire Sales Department.

**James E. Fuller,** former personnel executive at the Los Angeles, Calif., plant of the Goodyear Tire & Rubber Co., has been named personnel manager of Pathfinder Chemical Corp., Goodyear's Niagara Falls, N. Y., plant.

**William D. Appel,** chief of the Textiles Section, National Bureau of Standards, will be presented with the Harold De Witt Smith Memorial Medal by Committee D-13 of the American Society for Testing Materials during the Spring Meeting in New York City.

**Philip J. Lowry** has been named manager of the Akron sales district for Mobay Chemical Co., St. Louis, Mo., while L. Dean Tyler ,has been appointed manager of the eastern sales district.

**Dr. Francis M. Parker,** former marketing director of the Chemical Division of Merck & Co., Inc., has been named to the newly created position of director of marketing for American Viscose Corp., Philadelphia, Penna.

**William I. Burt,** president of Goodrich-Gulf Chemicals, Inc., was recently presented with a wrist watch to mark his 30th year of service with the B. F. Goodrich organization.

**B. F. Isley,** general manager of the Wire and Cable Department of General Electric Co., has been named chairman of the Wire and Cable Section of the National Electrical Manufacturers' Association, succeeding A. D. R. Frazer.

**A. N. Spanel,** founder and chairman of the board of the International Latex Corp., was the first American to participate in a recent international question-and-answer program via a direct hook-up to France. Speaking from New York, Mr. Spanel answered questions from French citizens.

**Morey Weisman,** sales manager of the Middletown Rubber Corp., has been elected chairman of the Textile Veterans' Association.

**O. B. Schier, II,** has been appointed deputy secretary of the American Society of Mechanical Engineers.

**Paul W. Litchfield,** chairman of the board of Goodyear Tire & Rubber Co., has been awarded a citation by the National Aeronautic Association in recognition of his contributions to the progress of aeronautics.

**E. D. Buckley,** formerly purchasing agent for the firm, has been appointed manager of purchasing for the Dunlop Tire and Rubber Corp., Buffalo, N. Y.

**Albert P. Shutts,** formerly New York district sales manager of the Becco Chemical Division, Food Machinery & Chemical Corp., has been promoted to assistant sales manager of the division.

**Like to make a suggestion to the industry? Write a letter to the editor! (See page 760).**

## Named To Managerial Post

**William J. Bolin**

William J. Bolin has been appointed central district sales manager of the American Zinc Sales Co., with headquarters at Columbus, Ohio. A graduate of Davidson College, Davidson, N. C., Mr. Bolin served in the Armed Forces for five years and attained the rank of major in the Infantry. He joined the American Zinc Sales Department in New York in 1947 and in 1949 he was transferred to the sales office in Columbus, Ohio, to cover the Ohio, Indiana and Pennsylvania area.

## Expanding Isocyanate Output

Mobay Chemical Co., St. Louis, Mo., has announced that the first additional production unit for the manufacture of isocyanates will be completed on or about March 1 to meet the company's expansion program schedule. After extensive testing and evaluation of the company's production units, it was decided to increase the overall plant capacity by about 200 per cent. This will achieve maximum operating efficiency in the fully integrated manufacture of urethane chemicals, the company believes. The expansion planned will be in the nature of increasing the volume rate of certain production facilities already in place and is scheduled for completion early in 1958, the company says.

## G-E Promotes Darsie

George A. Darsie has been appointed eastern district sales manager for the Silicone Products Department of the General Electric Co. Associated with General Electric for nearly 10 years, Mr. Darsie was one of the first to join the sales force of the Silicone Products Department when the company began full scale development of its silicone operation after World War I. Headquarters for the Eastern District is at 254 Elizabeth Avenue, Newark, N. J., one of the 10 sales offices of the department throughout the country. Mr. Darsie joined General Electric in August, 1947, after graduation from Kansas University with a bachelor of science degree in electrical engineering. After several months experience on the company's test engineering program, he transferred to silicone sales.

## More News in Brief

The Industrial Chemicals Division of Olin Mathieson Chemical Corp., Baltimore, Md., is readying a line of nonionic surface active agents for general industrial use which it will market under the name "Poly-Tergent."

Dayton Rubber Co. is scheduling a series of in-plant seminars for major manufacturers in all parts of the country to acquaint them with the problems of development, manufacture and inspection of V-belts.

Hycar latices in textile finishes are covered in Issue No. 15 of the "Hycar Latex Newsletter." The 4-page publication is available on request to Goodrich Chemical.

Now available are the Proceedings of the 20th Anniversary Time and Motion Study and Management Clinic sponsored by the Industrial Management Society. Published by the Society, the Proceedings are available at $5.00 a copy.

Boston Woven Hose & Rubber Co. is now occupying warehouse facilities at 1925 Blake St. in Denver, Colo. The new warehouse has been established to facilitate prompt service and delivery in the mountain state area.

A new 4-page folder, detailing its recently introduced "Dilco Chemical Patches," for fast, sure tubeless tire repair, has been published by the Dill Manufacturing Co., Cleveland, Ohio.

Chemical Division of the Thermoid Co., Trenton 6, N. J., has announced the availability of two studies in which "Fortex A," a new extender, was used to improve the cohesiveness of inexpensive compounds.

Adhesive Products Corp., New York, N. Y., has announced the development of "Styro-grip," an improved styrofoam adhesive.

"Ever see anyone as crude as a crude rubber salesman?"

## Ellis Joins Hale And Kullgren

**Thomas J. Ellis**

Thomas J. Ellis has joined Hale and Kullgren Inc., Akron, Ohio, where he will operate as a consultant in automotive and industrial rubber products, including brake lining and friction materials. Mr. Ellis was formerly vice-president of the Thermoid Co., Trenton, N. J., and, previous to that, was associated with the Industrial Products Division of the Firestone Tire & Rubber Co., Akron, Ohio.

## Borden Chemical Appointments

Chemical Division of the Borden Co., New York, N. Y., has announced the appointment of Raymond J. Lodge as general manager of the Resins and Chemical Department and Charles W. Smith as general manager of the Polyco-Monomer Department. Eugene J. Sullivan, who had been top administrator for both departments, has been promoted to general sales manager of the entire Chemical Division. In the Coatings and Adhesives Department of the Chemical Division, Charles W. Bayley, Jr., and Austin I. Weber, research and development chemists, have been assigned to work on latex and coatings, respectively. Philip E. Coyle, Jr., has been named technical sales representatives for the Coatings and Adhesives Department in the eastern New England territory. Mr. Lodge, a Borden 20-year man, was formerly general sales manager for the Polyco-Monomer Department. Mr. Smith joined Borden in 1951 as head of chemical engineering at Bainbridge, N. Y. In 1956, he became assistant general manager for both the Resins and Chemicals and Polyco-Monomer Departments. Mr. Bayley, a graduate of Boston University, was formerly chief chemist at Dee's Adhesive and Chemical Co., Inc., Lynn, Mass. Previous to his appointment at Borden's, Mr. Weber was associated with the Gates Engineering Co., Wilmington, Del., as a development chemist. Mr. Coyle has been associated with the United Shoe Machinery Corp. and Heveatex Corp. since his graduation from Trinity College in 1933.

Allis-Chalmers Industries Group has opened a branch office at 508 Turner Street, Allentown, Penna.

# News in Brief

Issue No. 14 of the "Hycar Latex Newsletter" published by Goodrich Chemical discusses Hycar 1852, an improved pigment binding latex, and the effects of Hycar 1562 latex on the physical properties of paper.

A Koroseal food handling conveyor belt, made by Goodrich, now in use at the Owen Canning Corp., Owen, Wisc., is said to have eliminated spillage problems in the handling of cut beans and peas.

Hewson Co., Newark, N. J., has announced the appointment of the Carse Electric Corp., Albany, N. Y., to handle sales, field application and servicing on "Takk" control systems, test sets and power supplies.

"Neoprene Cable Jacket Compounds" are discussed in a new Technical Service Laboratory Bulletin issued by Godfrey L. Cabot, Inc., Cambridge, Mass. Ask for No. GD-17.

To help designers, engineers and fabricators choose the right plastic for any job, Bakelite has issued a revised 1957 edition of its "Condensed Reference File of Bakelite Plastics." Copies are available on request to the company.

Using a plug facing of Hycar rubber, DeZurik Shower Co., Sartell, Minn., has developed a plug type valve that is able to withstand the punishment of sewage influent, for valving raw sewage through disposal plant lines.

Columbian Carbon Co. has opened new Akron headquarters at 452 East Market Street.

A thousand and one ways to use pressure-sensitive tapes are disclosed in a new, unique handbook just published by Mystik Adhesive Products, Inc., Chicago, Ill.

Bulletin Supplement 2M-PVC, released by Schutte and Koerting Co., Cornwell Heights, Penna., describes the new Polyvinyl Chloride (PVC) Eductors which have just been added to the company's standard line.

Solvay Process Division of Allied Chemical and Dye has announced a revised, enlarged edition of their Technical and Engineering Service Bulletin No. 11 entitled "Water Analysis".

Harwick Standard Chemical Co., 60 South Seiberling St., Akron 5, Ohio, has published a bulletin describing a new color line known as "Stan-Tone PFC Polyester Paste Colors", designed to be completely compatible with all known polyester resins. Ask for Bulletin No. 02-160-0-9-56.

A 24-page, 2-color booklet, entitled "How to Operate a Lift Truck", has been offered by the Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oregon. Ask for Form 1214.

F. J. Fink & Co. has announced its new location at 221 Cherry St., Chardon, Ohio. The telephone number is Chardon 6-4113.

Reprints of the paper "Automatic Control of Insulated Wire Diameter" which discusses the practical aspects of control in production, are available by request, from Industrial Gauges Corp., West Englewood, N. J.

Manufacturing Chemists' Association, Inc., 1625 Eye Street, N.W., Washington 6, D. C., has announced the publication of revised safety data sheets on trichloroethylene (SD-14), ethyl ether (SD-29), phthalic anhydride (commercial) (SD-61) and mixed acids (SD-65), priced at 30 cents each.

Chemical Materials Department of the General Electric Co. has issued a new brochure, reproduced from Sweet's Product Design File, which includes detailed technical data, special properties and product features of rubber phenolic molding powders and other phenolic molding materials. Ask for CDC-322.

A technical manual which brings up to date the available information on analytical procedures, physical and chemical properties and industrial uses of ethylene oxide has been released by the Jefferson Chemical Co., Box 303, Houston, Texas.

Adhesive Products Corp., New York, N. Y., has announced the development of "No. 3679 Polygriptex", which creates a bond between polyethylene and paper or cardboard for the manufacture of combination polyethylene and paper bags.

Eastman Chemical Products Inc., Kingsport, Tennessee, has released a 4-page folder charting structural formulas, properties, composition and popular applications of the various "Tenox" antioxidants.

Rubba, Inc., New York, N. Y., has announced the development of "No. 347 Rubbatex" for adhering plastic bubbles to cardboard.

A new twelve-page Reliance Motor Selector, published by Reliance Electric and Engineering Co., 1099 Ivanhoe Road, Cleveland 10, Ohio, offers information on selection of a-c motors for specific applications. Ask for Bulletin B-2103-1.

Hodgman Rubber Co., Framingham, Mass., is producing sportsmen's air mattresses, formulated with Plioflex, that show longer life and good aging characteristics.

Adhesive Products Corp., has developed 'Kleen-Grip", a new type adhesive for adhering labels to plastic, metal and other surfaces, permanently or temporarily, depending upon requirements.

Baker Castor Oil Co., New York, N. Y., has appointed Gillies Inc. as its exclusive representative in the Denver-Salt Lake City area. Offices will be located in the Travel Center Building, 1640 Court Place, Denver 2, Colorado.

McKeever Electric Supply Co., Columbus, Ohio, has been appointed authorized stocking distributor of Asco Solenoid valves for the Automatic Switch Co., Orange, N. J.

Dow Corning Corp., Midland, Mich., has released a new brochure describing all silicone lubricants available in quantity from the company. Properties and performance of various silicone oils, greases and compounds are discussed and typical applications are listed and illustrated. Ask for Brochure No. 6-101.

Glyco Products Co., Inc., New York, N. Y., has released a new bibliography on dimethylhydantoin (DMH), which gives references on physical properties and chemical reactions for this new commercial product.

Bulletin 1-B, published by Sprout, Waldron & Co., Inc., Muncy, Penna., gives information on the Model HD Hammer Mill outlining various installation arrangements and describing the conventional products collecting systems which are available for use with this unit.

Technical notes on dimethylaminoethyl methacrylate, listing physical and chemical properties and applications of the material are available on request from Rohm & Haas Co., Washington Square, Philadelphia, Penna.

"Dust Control for Industry", a new sixteen-page illustrated reference bulletin for plant and maintenance engineers in the process industries, has been released by the Pangborn Corp., Hagerstown, Md. Ask for Bulletin No. 922.

The supersonic B58, newest Air Force super-bomber which was designed and built by the Ft. Worth Convair Division of General Dynamics Corp., is believed to be the first military aircraft employing a structural bonding adhesive, developed by Convair and Goodrich Industrial Products Co., to replace rivets in the fusilage, wings and tail assembly.

The new "1957 Reference Guide to Dow Corning Silicones," which has just been published, describes almost 150 commercially available silicone products which have been developed within the last year.

Tosco Enterprises, Akron, Ohio, has developed an electric fence post which has an open curl, covered with a sleeve of vinyl plastisol, based on Geon vinyl resin, to act as an insulating agent for electric wire.

### To Head Polymer Research

J. W. L. Fordham

Diamond Alkali Co., Cleveland, Ohio, has announced that J. W. L. Fordham, formerly senior chemist at the company's Exploratory Research Department at Painesville, Ohio, has been appointed group leader in charge of monomers and polymers research. A native of Canada, Mr. Fordham received a B.S. degree in chemistry and physics in 1946 from the University of Western Ontario, London, Ontario, Canada. He joined the Diamond research organization in 1955, after three years as a research chemist in another chemical company. Previously, he had spent six years in industrial research with two chemical firms in Canada. The author of several publications on synthetic rubbers and resins, Mr. Fordham holds a number of American and foreign patents. He is a member of the American Chemical Society, National Management Association and Diamond Technical Society.

### Two Firms Plan Tall Oil Unit

Plans are underway for the construction of a $4,000,000 plant at Nitro, West Va., to be jointly owned by Monsanto Chemical Co., Bound Brook, N. J., and Emery Industries, Inc., Cincinnati, Ohio, for the manufacture of fatty acids and tall oil rosin. The plant will be located at Monsanto's present Nitro facilities and will be operated by the firm's Organic Chemicals Division. A long-term agreement has been made under which the St. Regis Paper Co., New York, N. Y., will supply the plant with crude tall oil from it sulfate pulp mills.

### UBS To Make Montgomery Products

Montgomery Bros., Inc., Essington, Penna., and UBS Chemical Corp., Cambridge, Mass., have completed arrangements which call for the manufacture of all Montgomery industrial adhesives and protective coatings by UBS Chemical. Montgomery technical personnel have joined the UBS organization to insure the proper manufacture and control of all products. Montgomery will continue its present sales offices and all products will be available from warehouse stock.

### New Controlled-Curing Agent

M. W. Kellogg Co., Jersey City, N. J., has announced the development of a new vulcanizing agent which permits the controlled curing of elastomers and resins capable of being cross-linked with organic polyamines. Designated "HMDA-Carbamate", this material was first developed for use in vulcanizing Kel-F elastomer, Kellogg's fluorocarbon rubber, and shows promise as an efficient curative for other rubbers of the reactive halogen or acrylic ester type, according to Kellogg. Use of this material controls reactivity by shielding the active amine groups until curative and polymer are thoroughly mixed, thus creating a more uniform distribution of cross-links between elastomer molecules. A free-flowing white powder, soluble in water but insoluble in non-polar solvents, HMDA-Carbamate is especially satisfactory as a vulcanizing agent for Kel-F. Compounds containing three parts of HMDA-Carbamate per hundred of Kel-F along with metal oxides as modifiers, have been cured at 300°-350°F. to produce vulcanizates having excellent physical properties, thermal stability and resistance to mineral acids, oils and fuels at elevated temperatures, the company says.

### Purchase Jamestown Finishing

Wooster Rubber Co., Wooster, Ohio, has announced the purchase of the plant, equipment and inventory of Jamestown Finishing Products, Inc., Jamestown, N. Y. The firm will be operated as a wholly-owned subsidiary under the name of Jamestown Finishes, Inc. Manufacturers of plastics, plastic paints and baked enamel finishes for industrial users and special plastic coatings for fabrics and wire products, the new subsidiary will increase its production volume of these products and also produce houseware items for national distribution. Former officers of Jamestown Finishes, Inc. will serve in management positions in the new company. Ben W. Avallone has been named president; L. D. Anders, vice-president; John P. Hart, assistant treasurer, and J. Carl Myers, assistant secretary. Wooster Rubber executives who will also be active in the new company's management are Forrest B. Shaw as vice-president; Donald E. Noble, vice-president and treasurer, and J. Richard Raeder, secretary. James R. Caldwell, president of Wooster Rubber, will serve as chairman of the board of Jamestown Finishes.

### New Basic Technology Course

The Evening Division of Villanova University, Villanova, Penna., in cooperation with the Philadelphia Rubber Group, is offering a course in Basic Rubber Technology during the spring semester. The course is being conducted on a graduate level of instruction and under conditions of strict control, with the first class scheduled to have been held on February 11. The course, under the direction of Aaron Back, will meet on succeeding Monday evenings from 7:30 to 9:30 p.m. A fee of $36.00 is charged.

### Woodrow Joins Dayton Rubber

Wallace H. Woodrow

Wallace H. Woodrow has been appointed to the newly created post of vice-president in charge of engineering for the Dayton Rubber Co., Dayton, Ohio. In his new post, Mr. Woodrow will carry out engineering programs already underway or pending, leading to the manufacture of new products that can be distributed through present channels. A native of Muskegon, Mich., Mr. Woodrow was graduated from Purdue University in 1941 with a degree in mechanical engineering. He has held top executive posts with the Plastics Division of Monsanto Chemical Co. in Springfield, Mass., and the Diamond Match Co., New York, N. Y. For the last six years, he served as vice-president of Hale & Kullgren, Inc., Akron, Ohio.

### Forms New Sales Division

In a move to gear its sales activities to a major corporate expansion program, which is now under way, Jefferson Chemical Co., New York, N. Y., has created a new division in its Marketing Department and established two marketing regions, covering the eastern and midwestern sections. The new division will be managed by A. K. May, who will be manager of sales research and development. In his new post, Mr. May will be responsible for determining the best avenues for product diversification, development of new sales and the establishment of a program for recruiting and training personnel for the planned expansion of the Marketing Department. J. R. Carlson has been promoted from New York district sales manager to eastern regional manager, and R. E. Werley, Jr., is being promoted from Chicago district sales manager to midwestern regional manager.

### Commodity Exchange Appointments

Frederick T. Koyle, partner in Carl M. Loeb, Rhoades & Co., has been elected a vice-president of the New York Commodity Exchange, Inc., to represent the Rubber Group. William T. Baird, Jr., president of the Baird Rubber & Trading Co., has been elected to the board of governors to represent the rubber group and Mathew S. Fox of Balfour Maclaine, Inc., has been re-elected to the board.

### Realigns Sales Department

A realignment, involving two major changes in the executive staff of the Sales Department of the Mansfield Tire & Rubber Co., Mansfield, Ohio, has been announced. John C. Moore becomes general sales manager over the Mansfield, Century and Inland Divisions, and Carl B. Gibson becomes general manager of the newly created Merchandising Division. Mr. Moore is vice-president and general sales manager of the Inland Rubber Corp., wholly-owned subsidiary of Mansfield Tire and Mr. Gibson has been managing sales of the Mansfield and Century Divisions. A native of Rockford, Iowa, who has been associated with Inland Rubber Corp. for the past 10 years, Mr. Moore, for a number of years previous was engaged in the tire business at the retail and manufacturers' sales level. He became vice-president and general sales manager of Inland Rubber in 1955. Mr. Gibson has been associated with Mansfield Tire for 27 years, first as advertising and sales promotion manager. For a period of 10 years, he served on the field sales staff, became district manager and then division manager. During the war years, he served on various government commissions by appointment because of his tire industry knowledge.

### Expanding Research Facilities

Neville Chemical Co., Pittsburgh, Penna., has announced plans calling for an expenditure of $750,000 to double its research facilities. A new $600,000 completely air-conditioned building will go up on the company's 50-acre Neville Island tract and $150,000 will be spent on new laboratory and office equipment. To man the new facilities, a 50 per cent increase in Neville's research staff is planned. This is part of an over-all expansion program begun five years ago. The new laboratory will accelerate research for new products and chemicals and enable the company to give expanded and improved technical services. Construction has already begun on the projected two-story, brick building which will contain 31,000 square feet of floor space. Two-thirds of the unit will be devoted to laboratory facilities and the remainder to administrative offices. It is scheduled for completion late this summer.

### Integrates Two Subsidiaries

Stauffer Chemical Co., New York, N. Y., has announced the integration of two former subsidiaries, Nyotex Chemicals, Inc., and New York-Ohio Chemical Corp., into the parent corporation in order to simplify and strengthen its organizational structure. The first will be operated as Nyotex Chemicals Division of Stauffer Chemical. Nyotex facilities are located at Houston, Texas, where it produces anhydrous hydrogen fluoride and aluminum chloride. New York-Ohio, with plants located at Niagara Falls, N. Y., Elkton, Md., and Dominguez, Calif., manufactures aluminum chloride, antimony trichloride and anhydrous hydrogen chloride. Sales of these products will be handled nationally by Stauffer's Industrial Chemicals Division.

## Financial News

### Parker Appliance Co.

Six months to December 31: Net income of $725,698, which is equal to $1.87 a share, compared with $65,592, or 17c a share, in the last six months of 1955. Net sales in the last six months of 1956 totaled $12,433,354, compared with $9,708,000 in the same period of the previous year.

### National-Standard Co.

Year ended September 30: Net income of $2,757,937, which is equal to $3.61 a common share, compared with $2,479,640, or $3.25 per common share, in the preceding year. Sales in 1956 totaled $44,065,000, compared with $39,718,000 in fiscal 1955.

### A. G. Spalding & Bros.

Year to October 31: Net income of $773,922, which is equal to $1.31 a share, compared with $580,630, or $1.04 a share, in the previous year. Net sales in fiscal 1956 totaled $38,442,675, compared with $26,857,810 in fiscal 1955.

### Plastic Wire & Cable Corp.

Year to September 29: Net income of $636,632, which is equal to $3.80 a share, compared with $322,548, or $1.98 a share, in fiscal 1955. Net sales in 1956 totaled $11,427,775 compared with $8,512,565 in the previous year.

### Lee Rubber & Tire Corp.

Year to October 31: Net income of $1,612,800, which is equal to $1.90 a share, compared with $1,750,071, or $2.06 a share, in fiscal 1955. Net sales in fiscal 1956 totaled $46,581,943, compared with $45,912,226, in the preceding fiscal year.

### Midwest Rubber Reclaiming Co.

Year to October 31: Net income of $702,687, which is equal to $2.29 a common share, compared with $766,978, or $2.50 a share, in the previous fiscal year. Net sales in fiscal 1956 totaled $8,928,224 compared with $9,672,896 in fiscal 1955.

### Rome Cable Corp.

Nine months to December 31: Net income of $1,716,000, which is equal to $3.08 per share, against $1,370,000, or $2.86 a share, in the last nine months of 1956.

### Alco Oil & Chemical Corp.

Three months to December 31: Net income of $81,000, compared with $27,632 in the six month period of April 1, 1956 to September 30, 1956.

### Ansonia Wire & Cable Co.

Year to October 31: Net income of $185,541, which is equal to $1.75 a share, compared with a net loss of $10,155 in fiscal 1955.

### Monamine 7-70 Thickening Agent

Mona Industries, Inc., Paterson, N. J., has announced the development of "Monamine 7-70", a product which is said to exhibit unusual thickening characteristics suitable for application to pigment grinding buffing compounds, latex paints, ore flotation, drilling muds, etc. Monamine 7-70 is a compounded amine-fatty acid condensate which gives clear solutions in distilled water, slightly hazy solutions with tap water. According to the company, a 10 per cent concentrated solution of Monamine 7-70 in water gives a viscous liquid, a 4 per cent concentrated solution sets up into a slow flowing gel with rubbery consistency. This indicates a micel formation with high cohesive forces, which would explain the strong shearing forces that develop on agitating the solution. In a 4 per cent concentrated solution of Monamine 7-70, the micel formation is stable. In lower concentrations, the viscosity decreases quickly, sometime in hours. A 1 per cent solution has a viscosity of 500-600 cps, and an 0.1 per cent solution, a viscosity of 100 cps, but after 12 hours, the viscosities drop 50 to 80 per cent. Samples are available on request to the company.

### Announces Floor Design Contest

The Rubber Flooring Division of the Rubber Manufacturers Association, Inc., New York, N.Y., has announced plans for a Rubber Floor Design Award competition which will be open to professional designers, architects, decorators and floor installers within continental United States. There will be a Designer's Award of $1,500 for the best-designed rubber floor installed in an institutional or commerical type building, and an Installer's Award of $500 for the flooring contractor who installs the Design Award-winning floor. There will also be six honorable mentions. Any floor installed between January 1, 1957 and December 31, 1957 will be eligible regardless of the actual design date. Entries may include installations which were designed previous to the announcement of this competition. For complete details of the competition and Official Entry Data Sheets, write to Rubber Floor Design Awards Committee, Rubber Flooring Division, The Rubber Manufacturers Association, Inc., 444 Madison Ave., New York 22, N. Y.

### Ansonia Dedicates New Plant

Ansonia Wire and Cable Co., which recently moved its facilities from Ansonia, Conn. to Ashton, R. I., has formally dedicated its new plant. Construction of the plant started about a year ago and machinery and equipment were moved last summer. The new structure covers three acres and is constructed of reinforced concrete beams and tilt slabs for outside walls, fabricated and raised into position at the site. The new building stands on a 17-acre plot of ground that affords ample space for expansion. While the plant is laid out for a smooth straight line of flow work, there is still room for some additional equipment under the present roof.

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### Blaine Joins Goodrich-Gulf

Robert P. Blaine

Robert Paul Blaine has been named manager of international sales for Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio. Mr. Blaine, a native of Cedar Rapids, Iowa, moves to Goodrich-Gulf from the B. F. Goodrich Chemical Co., where he had been technical service manager in international sales since 1952. Prior to joining Goodrich Chemical in 1944, in the company's sales-service laboratory in Akron, Mr. Blaine had been associated with the Atlas Powder Co. as an assistant supervisor at Weldon Springs, Mo. He received a B.A. degree from Coe College (Iowa) in 1941, and took up graduate work at Washington University in St. Louis. Mr. Blaine moves to his new position with a background which includes two years spent in Europe as European representative for Goodrich Chemical. During 1949 and 1950 he headquartered in Basle, Switzerland. Upon his return to the United States in 1950, he took up his technical service duties for Goodrich Chemical. He is a member of the American Chemical Society, the Society of Plastics Engineers, and the Cleveland World Trade Federation.

### Kleinert Elects New President

I. B. Kleinert Rubber Co., New York, N. Y., has announced the election of Roland H. Guinzburg as president succeeding the late Ralph Kleinert Guinzburg. Mr. Guinzburg, the new company president, joined Kleinert as a chemist in 1911. He became vice-president in charge of production at the company's factories in College Point, Queens, London and Toronto in 1930. In 1954, he was elected executive vice-president. Mr. Guinzburg is also vice-president of the College Point National Bank.

### G-E To Expand Irrathene Output

General Electric Co. has announced plans to expand production capacity of its irradiated polyethylene, "Irrathene", from 300,000 pounds to 1,600,000 pounds annually. The company has ordered five million-volt electron generators for a new facility which will make it possible to double the 1,600,000 pound production in the future.

### Appointed Research Director

Charles P. McHugh has been appointed director of research and product design at the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J. He succeeds William L. White, who has held that position since 1943. In his new position, Mr. McHugh will have complete charge of laboratory and engineering activities as they pertain to the development of new industrial rubber products and improved methods of making them. A graduate of M.I.T. in chemical engineering, he joined Manhattan Rubber in 1931, and was placed in charge of roll covering and tank lining development work. He was promoted to assistant manager of the Roll and Tank Department in 1943, becoming production manager for the department in the following year, and manager in 1952. In 1954 Mr. McHugh was made assistant director of research and product design. W. L. White, a graduate of Penn State, joined Manhattan in 1917 as an experienced technician in charge of reclaiming rubber. Though active in production work during the 20's, he was placed in charge of laboratory work in 1931. After serving as assistant factory manager in 1942, he returned to laboratory work as director of research and production design in 1943. At his own request, Mr. White desires to reduce his activity somewhat and will assume the title of technical consultant.

### Amoco Sets Future Plans

The newly organized Amoco Chemicals Corp., Chicago, Ill., plans an extensive research program for development and marketing of new products to supply domestic and foreign chemical industries. Amoco Chemicals was formed by consolidation of Pan American Chemicals Corp., a subsidiary of the American Oil Co.; Indoil Chemical Co., Standard Oil Co. (Indiana) subsidiary; and the former Hidalgo Chemical Co., a Stanolind Oil and Gas Co., subsidiary.

In addition to the products formerly offered by Indoil and Pan American Chemicals, the new corporation will also market the lubricating oil additives that have been handled by the parent company. The firm will invest heavily in research aimed at creating new products for the rubber, paint, plastic, and chemical industries, company officials said. Amoco Chemicals has manufacturing facilities in Texas at Brownsville and Texas City. The first major development project will be the construction of the only plant of its type, somewhere in the Midwest, for an exclusive new hydrocarbon oxidation process to produce aromatic acids from petroleum raw materials.

### Bolt Named to Succeed Connell

The newly organized Southern Rubber Group has announced the appointment of John M. Bolt as chairman to fill the unexpired term of the late Harmon Connell. Thomas R. Brown (Goodrich) will continue to serve as vice-chairman. William F. Gerrow, Jr. (Goodyear) has accepted the office of director to fill the position vacated by Mr. Bolt.

### Hagel Receives New Post

William Hagel

William Hagel, formerly vice-president and executive assistant of the United Engineering and Foundry Co., Pittsburgh, Penna., has been appointed vice-president in charge of operations. In this capacity, he will be in charge of manufacturing facilities and production and will also continue to supervise the company's Estimating and Sales Contract Departments. Mr. Hagel is a graduate of Carnegie Institute of Technology. Since he joined the company in 1917, he has successfully held positions as estimator, chief estimator, assistant to sales manager, assistant sales manager, manager machinery sales and manager of sales. In 1946, he was elected vice-president in charge of sales and in 1953, he was appointed a director of the company. He also serves as vice-president, director and member of the Executive Committee of Adamson United Co., Akron, Ohio.

### Scientific Manpower Study

B. F. Goodrich Co., Akron, Ohio, has issued "A Study of the Scientific Manpower Problem of the United States," with the hope that it will inspire action toward a solution on the part of business men, educators, and others who are interested. The study is designed to provide information upon which the extent of the nation's manpower needs may be gauged and to suggest possible areas of action for meeting the needs.

### Doubling 14-Inch Tire Output

Seiberling Rubber Co., Akron, Ohio, has announced that effective January 1, production of the 14-inch passenger tires of the company's "Sealed-Aire" and "Safety" models has been doubled. The production increase was made "to meet new demands in the replacement market", E. A. Hensal, production vice-president said. The company also markets its "Commuter" winter tire in the 14-inch size. The 14-inch Safety tires, which were previously produced with rayon fabric only, are now available with either rayon or nylon construction.

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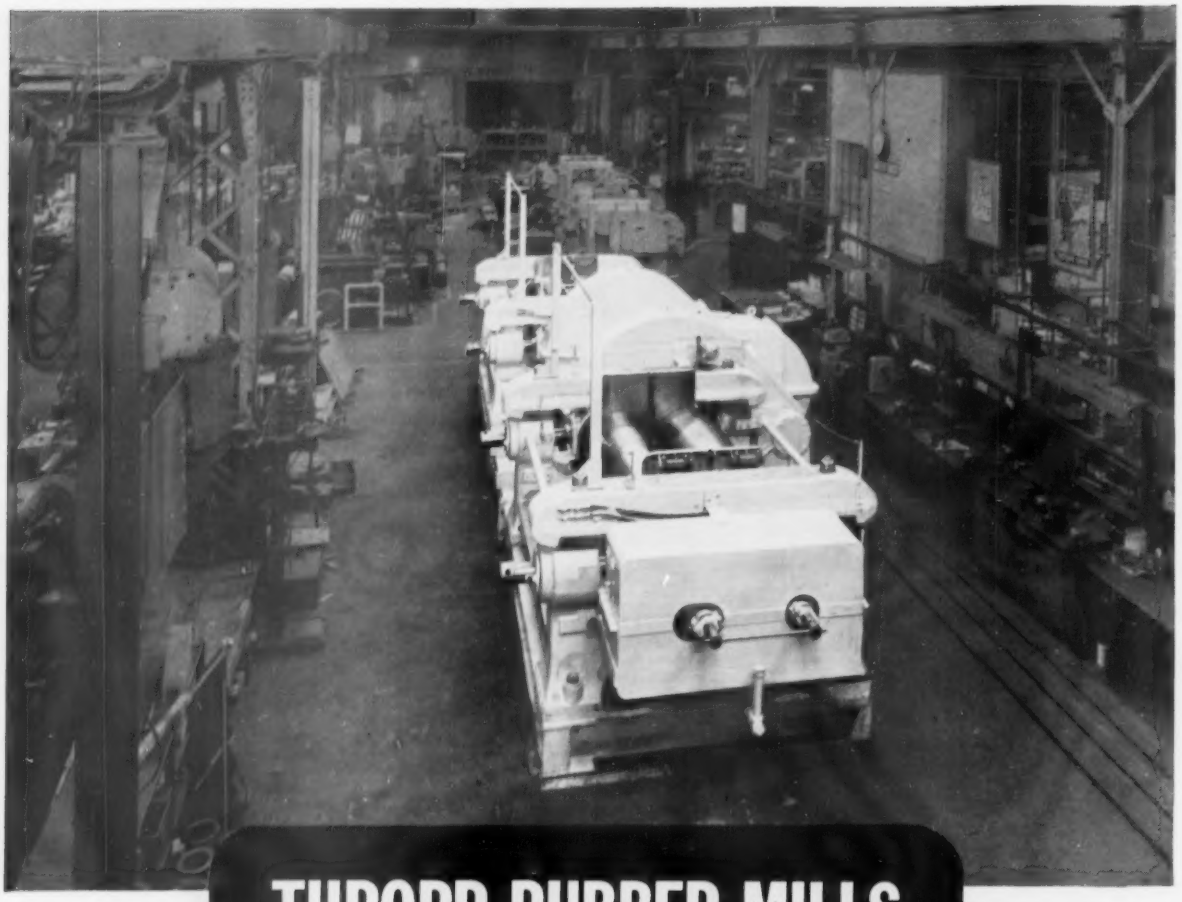

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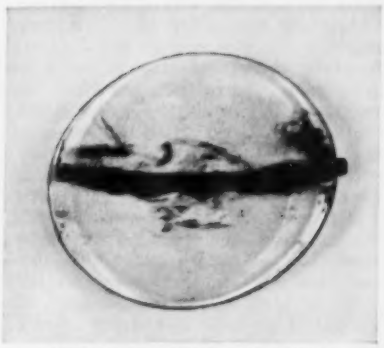
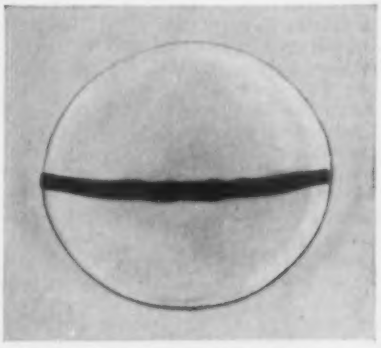
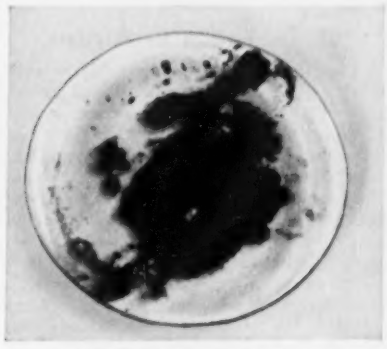


BUNA-N—10 min. immersion in RFNA

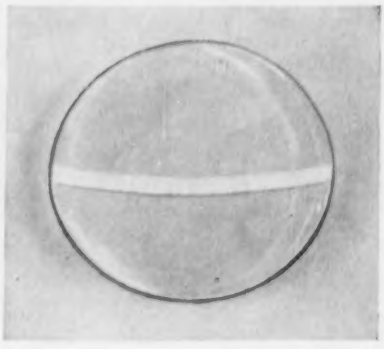
NATURAL RUBBER—10 min. immersion in RFNA



BUTYL—2 hr. immersion in RFNA



GRS—10 min. immersion in RFNA



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This *unique* combination of properties makes KEL-F Elastomer useful in applications such as heat-and-chemical-resistant hose, tubing, diaphragms, gaskets, seals, tank linings, corrosion-resistant clothing, paints, flame-resistant coatings, and electrical insulation.

If your work requires an elastomer with outstanding resistance to heat and corrosion, look into KEL-F Elastomer. Our technical staff is prepared to assist designers, engineers, and production men in adapting KEL-F Elastomer to their individual needs. Kellogg supplies KEL-F Elastomer in the gum form only. Names of qualified fabricators of specific end uses of KEL-F Elastomer are available on request.

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### Albert-Harris in Patent Suit

According to current reports, the partnership of Sydney L. Albert and Edward J. Harris in the Albert-Harris Co. of Akron, Ohio, is under stress because of an injunction filed over patent rights which finds the partners in opposition. Colonel Harold M. Reedall, a stockholder in Albert-Harris and a director of the Bellanca Corp., of which Mr. Albert is president, has filed suit against Mr. Harris and his associate, Dr. Adolph Frohlich, asking that they be enjoined from using and benefiting from patents and machines owned by the firm of Albert-Harris. Colonel Reedall charges that Mr. Harris conspired with Dr. Frohlich to divert to themselves all the inventions developed by Dr. Frohlich. He states that both men secretly filed applications for patents on new machinery without the knowledge of the Albert-Harris board of directors. Mr. Harris said it is apparent that Mr. Albert inspired the suit. Mr. Harris explained, however, that the suit doesn't mean that the Albert-Harris partnership is breaking up. "We are still friends," he commented. Mr. Albert stated that Colonel Reedall's suit "is entirely with merit and he is correct in all statements he has made." Inventions of Dr. Frohlich which are at issue include a vulcanizing machine which, it is claimed, will reduce curing time by 25 per cent; a tire made of wire and rubber which is said to be absolutely blow-out proof; a process which reduces the time for retreading tires by 75 per cent, and a push-button machine which automatically buffs tires for retreading.

### Akron Holds Panel Discussion

The Winter Meeting of the Akron Rubber Group held on January 25 at the Sheraton-Mayflower Hotel in Akron, Ohio, featured a panel discussion on "Physical Testing in the Rubber and Plastics Industries". The subjects discussed by each of the panel members are as follows: *Equipment*, David C. Scott, Jr. (Scott Testers); *Plastics and Insulated Wire*, John T. Blake (Simplex Wire); *Fabrics*, John H. Dillon (Textile Research Institute); *Tire Compounds*, John W. Liska (Firestone); *Mechanical Goods*, Sherman R. Doner (Raybestos-Manhattan); *Specialty Rubbers*, W. Newlin Keen (DuPont). L. V. Cooper (Firestone) acted as moderator for the panel. The after-dinner speaker was Tennyson Guyer (Cooper Tire), who delivered an amusing talk entitled "The Life of Your Time."

A report of the Nominating Committee was also presented at the meeting. The following members have been nominated for the offices noted: *Chairman*, Harold W. Catt (Goodrich); *Vice-Chairman*, S. C. Nicol (Goodyear) and L. A. Anderson (Leverett A. Anderson); *Secretary*, M. H. Leonard (Columbian Carbon) and C. Stalker (General Tire); *Treasurer*, I. J. Sjothun (Firestone) and George Popp (Phillips Chemical). The new officers will be announced at the Spring Meeting on April 5 and will take office on July 1.

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### Cyanamid Promotes Two

Organic Chemicals Division of American Cynamid Co., Bound Brook, N. J., has appointed R. W. McCullough as manager of technical services and George J. Sella, Jr., as sales representative for the Rubber Chemicals Department. The appointments were made to expand the Department's services. Mr. McCullough, a graduate of the Case Institute of Technology in Cleveland, Ohio, served for a number of years with the Firestone Tire and Rubber Co., Akron, Ohio, before he joined Cyanamid in 1950 as a sales representative at the company's Cleveland office. He was transferred to the Rubber Chemicals Department of the Organic Chemicals Division in Bound Brook in 1953. Mr. McCullough is a member of the American Chemical Society, Alpha Chi Sigma and many local rubber groups throughout the country. Mr. Sella joined Cyanamid in 1954 after two years of service with the armed forces. A graduate of Princeton University and the Harvard Graduate School of Business Administration, he recently completed a two-year technical and sales training program with the company. Mr. Sella is a member of the American Chemical Society and the American Institute of Chemical Engineers.

### Chemical Technology Encyclopedia

Interscience Encyclopedia, Inc., 250 Fifth Avenue, New York 1, N. Y., has announced publication of the "Encyclopedia of Chemical Technology". The Encyclopedia consists of 15 volumes of approximately 960 pages each and the set will be kept up-to-date by means of supplement volumes to be issued when necessary. The first 14 volumes, and some 300 pages of Volume 15, contain about 800 articles, each authored by a specialist in his field. Each article is reviewed by one or more other specialists, thus ensuring an authoritative treatment. Each article concludes with a selected bibliography. The balance of Volume 15 contains about 600 pages of index, with approximately 50,000 entries. The entire set of 15 volumes costs $375.00. A supplement volume, devoted to subjects in which recent advances have been particularly striking, will be published in the fall of 1957 at $25.00 a copy.

"Where did you get this slug cutter — from Las Vegas?"

### Duraseal Vinyl Waterstops

Long ridged ribbons made of Bakelite vinyl resins have been introduced by Electrovert Inc., 489 Fifth Ave., New York, N. Y., for use as seals in joints between concrete structures to prevent water leakage. The diaphragm-type waterstops for expansion and construction joints are installed when the concrete is poured and are expected to outlast the structures in which they are used, according to the manufacturer. Said to have excellent elongation, the ribbons can stretch or contract as joints open and close in winter and summer. Ridges on both sides of the material result in a better grip on the concrete. A tensile strength of not less than 1,900 pounds per square inch, excellent tear resistance and its elastomeric properties enable the product to withstand movements of masses of concrete without being sheared. The material has strength, elasticity and resistance to water, acids and alkalies in concrete, the company says. The ribbons may be spliced by heating the ends to be joined and holding them together until they form a bond. Called "Duraseal", the product is available in a variety of ridge patterns and in widths from three and three-quarter inches in fifty-foot coils.

### Offering Glycidyl Methacrylate

A new chemical building block—glycidyl methacrylate—is being offered in experimental and pilot plant quantities by the Finishes Division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., as a convenient way of introducing epoxide groups into vinyl polymers or vinyl groups into condensation polymers. Physically, glycidyl methacrylate is a light-colored, almost odorless liquid. The monomer may be polymerized or copolymerized through the double bond and further reacted through the epoxide, or the oxirane ring may be first polymerized so as to leave the vinyl group available for crosslinking. GMA will polymerize thermally, with ultra-violet light, or with the usual free radical or ionic polymerization catalysts. Thus, copolymers may be made containing any desired amount of functional groups by varying the proportion of GMA in the monomer charge. GMA holds promise in the rubber and other fields. It is being supplied at a development price of $5.00 a pound. If full-scale manufacturing is reached, cost reduction is likely.

### Kentucky Sales Office Moved

The eastern sales office of the Kentucky Color & Chemical Co., Louisville, Ky., has been moved to 17 Academy St., Newark 2, N. J. The new telephone number is Market 2-4464. Until recently, both the office and warehouse of the organization were located in Brooklyn. Kentucky's warehouse stock was recently moved from Brooklyn to Jersey City at the National Docks Warehouse. According to the company, the move will afford an improvement in service and accessibility to customers in northern New Jersey and metropolitan New York.

Siempelkamp

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**up to the largest dimensions required**

G. Siempelkamp & Co. • Maschinenfabrik • Krefeld

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### J. H. Day Merged Into Cleveland

Cleveland Automatic Machine Co., Cincinnati, Ohio, has announced its merger with the J. H. Day Co., Inc., also of Cincinnati. The merger became effective on December 31, 1956, and the name of the continuing corporation is the Cleveland Automatic Machine Co. Day operations will be continued as the J. H. Day Company Division of the Cleveland Automatic Machine Co. The merger of the two companies is part of the expansion and diversification program of the R. K. LeBlond Machine Tool Co. which owns Cleveland Automatic. The 75-year-old R. K. LeBlond Machine Tool Co., which is the world's largest builder of a complete line of lathes, recently acquired the Fosdick Machine Tool Co. of Cincinnati, builders of drilling machines, grinders and boring mills.

Cleveland Automatic was founded in 1891 and has a long record as an industry leader. It manufactures a complete line of single spindle automatic screw machines as well as a line of high pressure-hydraulic die casting machines. The J. H. Day Co. was founded in 1887 and is one of the leading companies which builds processing machinery. This equipment is widely used in the rubber, baking, paint and varnish, printing ink, chemical, pharmaceutical, cosmetic, paper and pulp and food industries. Future production of both "Cleveland" and "Day" products will be performed in the company's two modern plants, one of which has recently been expanded. An experienced engineering department will keep both "Cleveland" and "Day" products modern in every respect and develop new equipment from time to time.

New officers of Cleveland Automatic, which were elected January 2, 1957, are Harold R. LeBlond, president; Nicholas Peay, executive vice-president; Richard E. LeBlond, vice-president; Martin Miller, (formerly J. H. Day, president) vice-president; John Prohaska, vice-president; Robert V. Leighton, Jr., secretary and assistant treasurer, and Frank Stenger, treasurer and assistant secretary.

### To Build New Butyl Plant

Petroleum Chemicals, Inc., New Orleans, La., has announced plans to construct a butyl rubber plant at Lake Charles, La., with an initial capacity of 30,000 tons a year. The new plant will represent an investment of over $17 million and it is hoped that full production will be achieved before January, 1959. The plant will be so constructed that capacity can be expanded by 50% at a later date. Petroleum Chemicals has acquired a license from the Standard Oil Co. of New Jersey covering patents and know-how in the manufacture of butyl rubber. The new butyl plant will be the first built since World War II and will increase national productive capacity for butyl rubber by about one-third. Foster Wheeler Corp. has contracted to build the plant on a site adjoining Petroleum Chemicals' other petrochemical plants at Lake Charles. The butyl rubber plant will draw its raw material requirements from the hydrocarbon streams available at the Lake Charles refineries of the Cities Service and Continental Oil Companies, joint owners of Petroleum Chemicals.

### Improved Insoluble Sulfur

An improved type of insoluble sulfur for use in rubber compounding has been developed by the Research and Development Department of the Stauffer Chemical Co., New York, N. Y., and will soon be offered to the trade. The new product will be marketed under the "Crystex" trade name, but as a specially oil-treated form. The new oil-treated grade of Crystex will offer several major advantages to rubber compounders, the company states. It will, for instance, have an extraordinarily low dusting level which reduces the fire hazard encountered in the handling of ordinary sulfurs. Moreover, the new product has markedly superior properties in terms of ease of dispersion in rubber formulations. Stauffer is now installing new facilities at its Monongahela, Penna., plant to manufacture the oil-treated grade of insoluble sulfur.

### Appoints Two Vice-Presidents

Botwinik Bros. of Mass., Inc., and the Sherman Rubber Machinery Co., both of Worcester, Mass., have announced the promotion of Oliver W. Nelson and Arne C. Johnson to vice-presidents. Mr. Nelson, who was formerly associated with the Reed-Prentice Corp., Worcester, Mass., joined Botwinik in February, 1948, as foreman. In 1955, he was named plant superintendent and in 1956, general superintendent. Previous to his association with Botwinik, Mr. Johnson was also associated with Reed-Prentice and was previously with the Norton Co. In 1946, he joined Botwinik as a foreman, and was promoted to sales engineer in 1951.

## West Coast News

Three members of the Los Angeles Rubber Group participated in the 31st Los Angeles Open Golf Tournament held recently. Skip McMahon (Excell Chemical) served as chairman; Don Montgomery (Xylos Rubber) served as course construction chairman; Milt Churchill (Naugatuck Chemical) supervised first tee operations.

R. W. Maney of the Goodyear Tire & Rubber Co., has been elected to a two-year term on the board of directors of the Merchants and Manufacturers Association. Bill Haney, Kirkhill Rubber Co., has been re-elected for another two-year term on the board.

Ted Smart, formerly associated with Kirkhill Rubber, is now purchasing, methods and procedures supervisor of the E. B. Wiggins Oil Tool Co.

Fred Owne, previously associated with the W. J. Voit Rubber Co., is now associated with the Gross Manufacturing Co.

Carl Dudugjian has been named technical manager of tire construction at the Los Angeles plant of the B. F. Goodrich Co.

### Develops Pluronic Polyethers

Development of three pluronic polyethers for use in the manufacture of polyurethane foam plastics has been announced by Wyandotte Chemicals Corp., Wyandotte, Mich. Field tests indicate that use of these materials offers lower manufacturing costs for products embodying foam plastics, and improved product life. According to the company, there is virtually no change in the physical properties of the pluronic based polyurethane foams following the accelerated humid aging tests specified by the Society for the Plastics Industry. These products will eventually be manufactured and sold by the company's Michigan Alkali Division. The polyurethane grade of polyethers are made up of specially selected members of Wyandotte's pluronic and tetronic series of nonionic surface active agents. Flexible foams varying from highly resilient types, suitable for cushioning, to relatively dead foams, required for automotive crash pads, may be prepared by varying the formulations or choice of polyethers.

Suitable for the automobile, furniture, insulations, flooring and other industries, preliminary experiments indicate that polyether may also find use in the development of polyurethane films, coatings, adhesives and elastomers. The latter application offers the possibility of improving tires so that 100,000 miles of service may be obtained. Wyandotte also has developed and is currently evaluating an odorless catalyst for polyurethane preparations, which enables the production of odor free foams. The catalyst, a piperazene derivative, is now available in limited commercial quantities. A cross linking agent trade marked "Quadrol", prepared by the condensation of four molecules of propylene oxide with ethylene diamine, is also being made available.

### New Philippine Resins Plant

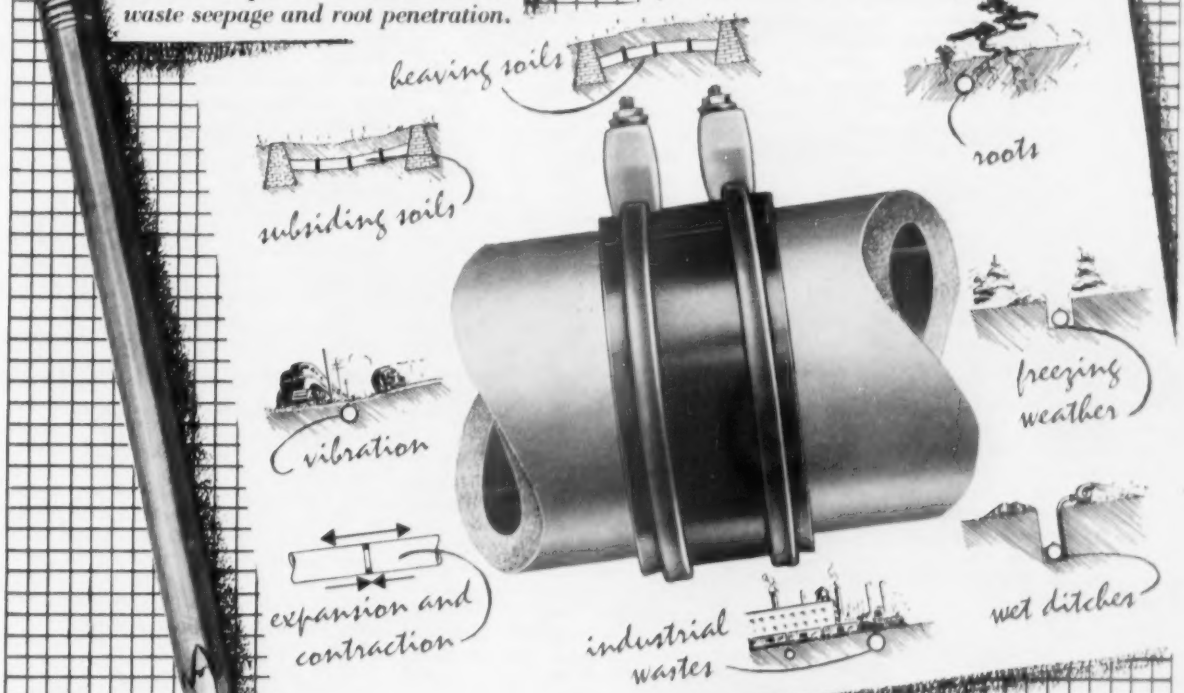
Reichhold Chemicals, Inc., White Plains, N. Y., has announced that its associated company, Resins, Inc., is building a new plant in Manila, Philippine Islands, for the manufacture of synthetic resins. Resins, Inc. will operate the plant under license from R.C.I. using that company's technical knowledge and processes. The new plant will produce resins for the expanding surface coatings, paper, textiles, furniture and lumber industries in the Philippines. Initial plant capacity is expected to be six million pounds annually. This will be the twenty-third foreign plant manufacturing R.C.I. resins. Reichhold owns thirteen plants in the U. S.

### Named Central Services Manager

Edward L. Mears has been appointed manager of the Central Services Division of the Dewey and Almy Chemical Co., Cambridge, Mass. Mr. Mears, who was formerly manufacturing manager of the Container and Chemical Specialties division, will be in charge of industrial relations, public relations, advertising, purchasing, and market research. He has been associated with Dewey and Almy since his graduation from the Massachusetts Institute of Technology in 1930.

# Problem

*National Sewer Pipe Limited needed a flexible sewer coupling that could be laid in any kind of weather and remain impervious to industrial waste seepage and root penetration.*




# Solution

They chose Polysar Butyl 301. This special type of Polysar has high resistance to ozone, water, heat and cold—remains constantly flexible—and gives a pressure-tight fit unaffected by either sewage or soil attack.

The example stated here is just one instance of how Polysar rubbers and Polymer's research chemists write new uses for rubber into the diary of synthetic rubber. In countless industries Polysar synthetic rubber is making better rubber products.

If you have a technical problem it may well be that Polysar synthetic rubber holds the best answer. Write to our Sales and Technical Service Division, Polymer Corporation Limited, Sarnia, Canada.

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***POLYSAR RUBBERS—General Purpose (hot, cold and oil extended)...Special Purpose...Latices...Oil Resistant...Butyl**

**POLYMER CORPORATION LIMITED**

**SARNIA • CANADA**

**NOTHING PERFORMS LIKE RUBBER — *The best buy for your money***

# Canadian News

Visking, Ltd., with two plants in Canada and a third planned, has become a division of the Union Carbide and Carbon Corp., New York, N. Y., through recently finalized arrangements. The transaction involved an exchange of one Union Carbide share for 2½ Visking shares. This brings Visking, polyethylene film producer, and Union Carbide Canada, Ltd., which will produce polyethylene resins at its new multi-million dollar plant in Montreal, under the same parental umbrella, resulting in the first fully integrated ethylene operation in Canada.

Union Carbide has almost completed a $15 million petro-chemical and polyethylene plant in Montreal, which will use gases from local refineries as the raw materials source. Visking, having added 30% capacity to its Lindsay, Ont., plant, plans construction of another $500,000 film plant at Winnipeg, with completion scheduled for late 1957. It is reported that Union Carbide will ship the resins from its new Montreal plant to the Visking plants at Lindsay and Ajax, Ont., and possibly out to the Winnipeg works when that comes into operation. It is also believed that the move may bring a further price cut in polyethylene film, which has been getting steadily cheaper as its markets increased. The last reduction—of about 5%—took place earlier this year following a drop in the price of resins.

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Polymer Corp., Sarnia, Ont., plans a 1957 capital expenditure of $7 million on new projects and $4 million for the completion of work already begun. Close to $5 million will be devoted to capital projects that will increase Polymer's rubber and butadiene production capacity in order to supply growing demands. Current expansion of neighboring oil refineries will increase supplies of butadiene and butylenes and modification of Polymer facilities will be made to utilize these feedstocks. Plans are also being made for a new plant which will permit Polymer to produce additional quantities of butadiene as the first major step to augment its internal supply of this raw material.

Meanwhile, Polymer and the Oil Chemical and Atomic Workers Union have been scheduled to appear before the Canadian Conciliation Board to present arguments on the union's renewed attempt to set a stiff wage-and-benefit pattern for Canada's chemical industry. Polymer, who feels that the company is already paying top rates, has made a wage offer of 22c to 33c, spread over a three-year period, with 12c-19c immediately. The union, however, has maintained its initial demands and no progress has been made toward settlement to date. Main union demands are: a 20 per cent hike on a one-year contract; double time for all overtime; triple time for holiday work; a wide assortment of other wage and benefit increases; all promotions to be based on seniority without regard for ability; arbitration of all disputes, whether or not in the area covered by the company-union contract; elimination from the contract of the management rights clause. This is one of the biggest packages ever demanded of a Canadian employer. The recently established union has not modified its demands since October.

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The first contract in the Canadian rubber industry to incorporate an annual guaranteed wage scheme has been signed at Whitby, Ont., by the Dunlop Rubber Co. and Local 494 of the United Rubber Workers of America. The plan, called the "Supplementary Unemployed Benefit Contract," will affect 585 production employees. Beginning next May, the company will make contributions of three cents an hour for each employee. Payments to laid off workers will be made starting May, 1958 and benefits will be paid for a total of 26 weeks. Under the new contract, which extends over an 18-month period, it is possible for an employee to receive a total of $65.00 a week.

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The Textile Fibres Division of E. I. du Pont de Nemours & Co., Inc., of Canada has announced the organization of a three-man team to handle the sale of nylon yarn to tire manufacturers, and to provide merchandising and technical service to the industry. Members of the newly-appointed unit are R. C. Finlay, product sales manager, nylon tire yarn; W. W. Krebs, in charge of tire merchandising, and R. E. Cook, technical service. Messrs. Finlay and Krebs will make their headquarters in Toronto, Ont., while Mr. Cook will work out of Kingston, Ont., where DuPont of Canada's nylon plant and laboratories are located. The company recently announced the installation of additional facilities there for the testing and development of nylon tire yarn.

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Ralph Hager has been appointed to the new position of manager of petroleum company tire sales for B. F. Goodrich Canada, Ltd. Mr. Hager's new responsibilities will include all phases of sales and field promotion activities with oil company associates of B. F. Goodrich. Previously manager of sales promotion, tire division, Mr. Hager joined Goodrich in 1952. His headquarters will be at the Kitchener, Ont., head-office.

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Kenneth Zettel has been appointed general supervisor of the Industrial Products Sales Division, Toronto district, B. F. Goodrich Canada, Ltd. Born and educated in Kitchener, Ont., Mr. Zettel joined Goodrich in 1947. He will report to L. G. Ratz, Toronto district manager.

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R. M. Ferguson has announced a move to a new address. The firm is now located at 4201 Dundas St. West, Toronto 18, Canada. The telephone number remains the same, however, Belmont 3-1401.

### Fortiflex Plant On Stream

Celanese Corp. of America, New York, N. Y., has announced that a new plant for the manufacture of polyolefin resins, located near Houston, Texas, will be on stream in February. The resin, called "Fortiflex," will be made under license from Phillips Petroleum Co. An ethylene polymer and a member of a new group of plastics, sometimes referred to as "low-pressure polyethylene," products made of Fortiflex will resemble those made of polyethylene, but will provide properties which will permit its use in many fields now barred to polyethylene. Fortiflex based products will have an unusual combination of rigidity, heat resistance, toughness, chemical inertness and the ability to withstand prolonged exposure to live steam as well as temperatures as low as —180°F. According to the company, current research indicates the likelihood of future modifications of the basic properties of this material that should result in the development of a family of Fortiflex polyolefin resins suited to a variety of processes and fabricating applications.

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### Forms Organic Chemicals Unit

Food Machinery and Chemical Corp. has announced the formation of the Organic Chemicals Division which has assumed responsibility for products of the company's Ohio-Apex Division as well as for a variety of specialty organics formerly associated with the firm's Westvaco, Becco and Fairfield Divisions. Henry S. Winnicki is the president of the Organic Chemicals Division, while Bert S. Taylor, manager of the Ohio-Apex Division is vice-president of the Organic Chemicals Division. Bernard H. Jacobson, FMC vice-president and president of the Ohio-Apex Division, is chairman of the FMC Organic Chemicals Policy Committee. One of the primary aims of the new division is to produce and market organic chemicals and plastics developed through the activities of the central research laboratory of FMC's Chemical Divisions at Princeton, N. J.

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Morningstar-Paisley of Canada, Ltd., has established a new Toronto, Ont., office and warehouse at 207 Queens Quay West. Robin T. Hazell has been appointed sales and service representative with headquarters at the Toronto office. Mr. Hazell will specialize in the starch, dextrine, and natural gum products of the Morningstar line widely used in the production of food and pharmaceutical products, in paper conversion, and by the chemical processing, oil drilling and ore beneficiation industries. Warehouse stocks of the company's products will also be established at Montreal. Canadian subsidiaries and affiliates of U.S. firms will, thus, have supplies and services quickly available from both eastern Canadian hubs of production. Plans for the near future also include producing in Canada the full line of Paisley liquid vegetable, casein, animal glue and polyvinyl resin adhesives. Such adhesives are widely used in labeling, packaging, packing, bookbinding, printing and woodworking.

PLYMOUTH

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*Each one of the beautiful '57 Chrysler Corporation cars features Enjay Butyl weather-stripping on the big, wrap-around windshield and rear window. With Enjay Butyl's outstanding resistance to aging, moisture and sunlight, you can count on perfect performance for the life of the car.*

IMPERIAL

# *FRONT AND REAR*... ENJAY BUTYL RUBBER WEATHER-STRIPPING SEALS FOR SURE!

Come rain or shine, Enjay Butyl, the weather-proof rubber for window weather-stripping out-performs and out-lasts *all other* rubbers, synthetic or natural. *Moisture-proof* and *impervious to sunlight*, this is the rubber that combines outstanding shock resistance with unparalleled life-expectancy.

In more than 100 places on today's new cars, Enjay Butyl has demonstrated its profitable advantages over all other rubbers. Under the hood . . . in chassis and body... parts made from this super-durable, all-weather rubber have helped make today's new cars safer, more comfortable, and mechanically more sound. For further information, and for expert technical assistance, contact the Enjay Company.

ENJAY BUTYL

Enjay Butyl is the greatest rubber value in the world . . . the super-durable rubber with *outstanding* resistance to aging • abrasion • tear • chipping • cracking • ozone and corona • chemicals • gases • heat • cold • sunlight • moisture.

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**ENJAY COMPANY, INC., 15 West 51st Street, New York 19, N. Y.**

*Akron • Boston • Chicago • Los Angeles • New Orleans • Tulsa*

# Obituaries

### *H. E. Nye*

H. E. "Bill" Nye, formerly general manager of Delco battery operations for the Delco-Remy Division of the General Motors Corp., died on December 30, 1956, in Tucson, Arizona. He was 63 years old. Mr. Nye, who retired in 1955, was born in Dayton, Ohio. He joined the Delco-Remy organization in 1919 as a member of the purchasing staff and later advanced to divisional purchasing agent. In 1929, Mr. Nye was named a member of the general manager's staff, a post he held until 1945 when he was named manager of battery operations. He was appointed executive assistant for battery operations in September, 1954. During his later years with the division, Mr. Nye was responsible for plants at Muncie, Ind., New Brunswick, N. J., and Anaheim, Calif. Active in civic affairs, Mr. Nye was a member of many community organizations. He is survived by his wife and daughter.

### *William D. Anderson*

William Dickson Anderson, chairman emeritus of the board of the Bibb Manufacturing Co., Macon, Ga., died on January 20 after a long illness. He was 83 years old. Mr. Anderson had been identified with Georgia's textile industry for more than sixty years, and was associated with the Bibb mills for more than 50 years. In 1920, he became president of the company and held that office until 1936, when his son, William D. Anderson, Jr., was named president. The death of his son returned him to the post, which he held until 1947.

### *Edwin A. Foote*

Edwin A. Foote, assistant to the executive secretary of the Mechanical Division of the Rubber Manufacturers Association, New York, N. Y., died on January 11. Mr. Foote would have been 59 years old on April 14. Associated with RMA for the past 23 years, Mr. Foote served in the position he held at the time of his death for some 12 years. In this capacity, he acted as secretary to the technical committees of the Mechanical Division. Prior to joining RMA, Mr. Foote had worked with a New York City newspaper as a reporter.

### *Roger A. Mathes*

Roger A. Mathes, chemist and a senior scientist at the B. F. Goodrich Research Center, Brecksville, Ohio, died on January 25 at the Akron General Hospital, Akron, Ohio. He was 53 years old. Born in Batavia, N. Y., Mr. Mathes had been with Goodrich for 30 years and held a number of patents on rubber chemicals. Mr. Mathes was a member of the American Chemical Society and the Goodrich Twenty-Year Club.

### *Ralph K. Guinzburg*

Ralph K. Guinzburg, president of the I. B. Kleinert Rubber Co., New York, N. Y., died on January 15 at his home in New York City. He was 65 years old. Mr. Guinzburg began his career as a labor reporter and later became editor and publisher of a weekly newspaper. In 1915, he joined Kleinert, which had been established by his grandfather in 1871, as assistant treasurer. He became president in 1928, succeeding his father. Mr. Guinzburg was a leader in Jewish philanthropic work, serving as president of the Jewish Family Service, secretary of the National Jewish Welfare Board, a member of the Citizens Budget Commission of New York, and as an official of many other civic and welfare organizations. Surviving are his wife, two daughters, and two brothers.

### *Irving Schulman*

Irving Schulman, formerly associated with A. Schulman, Inc., in an executive capacity for twelve years, died on November 19 in City Hospital, Akron, Ohio. He was 42 years old. At the time of his death, Mr. Schulman was secretary of the Holub Iron and Steel Co., Akron, a firm with which he had been associated for six years. A native of Akron, Mr. Schulman was graduated cum laude from Mercersburg Academy in Pennsylvania and received a B. S. degree from the Wharton School of Finance of the University of Pennsylvania. He was a member of several civic and social organizations and of the Executive Committee of the Northern Ohio Chapter of the Institute of Iron and Steel.

### *John F. Shea*

John F. Shea, vice-president in charge of sales for the Becco Chemical Division of Food Machinery and Chemical Corp., Buffalo, N. Y., died on November 26 at the Roswell Park Memorial Institute in Buffalo, after a long illness. He was 51 years old. Mr. Shea, a native of Fitchburg, Mass., received his technical education at the Lowell Textile Institute, Lowell, Mass. He joined Becco in 1930, serving first as a field representative and later as manager of the New England territory. He moved to Buffalo in 1953 when he was promoted to sales manager for the company and in 1955, he was elected vice-president in charge of sales.

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A 48-page booklet listing over 300 business promotion events, legal holidays and religious observances, entitled "Special Days, Weeks and Months in 1957" and an 8½ by 11 inch, 26 page "Trade Promotion Planning Calendar" are available at 50c per copy from the Domestic Distribution Department, Chamber of Commerce of the United States, 1615 H Street, N.W., Washington 6, D.C.

### Develops New Sprinkler Head

Goodyear Tire & Rubber Co., Akron, Ohio, has announced that reducer fittings and an improved sprinkler head have been added to the all-rubber underground sprinkling system manufactured by the company. The new flush type and pop-up head covers a minimum of 20 feet and has the advantage of a low-angle raindrop-type spray, which soaks completely with low evaporation and little interference by wind, the company says. The rubber system was introduced nationally in 1955 and is said to be the only one of its type on the market. According to the company, rubber parts used are not harmed by alternate freezing and thawing. Resistant to electrolysis, corroding, pitting and accumulation of deposits, the rubber pipe remains stable in any type soil that is suitable for growing plants or grass. The company claims that reducer fittings, tees, ells and bushings in rubber will cut costs by reducing installation time. The new fittings include four tee sizes: ¾ by ½ by ¾-inch, ½ by ½ by ¾-inch, 1 by 1 by ¾-inch, and 1 by ¾ by ¾-inch; one reducing ell, ¾ by ½-inch; and two reducer bushings, ¾ to ½-inch and 1 to ¾-inch.

### DMHF Water Soluble Resin

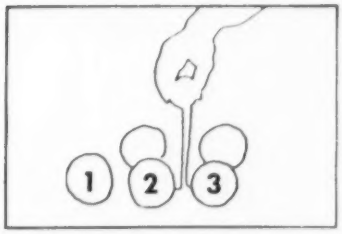
Glyco Products Co., Inc., New York, N. Y., has introduced a new water soluble synthetic resin that is compatible in various concentrations with glycols, formamide, acetamide, urethane, glycollates, "Carbowax," gelatin, dextrin, starch, polyvinyl alcohol, neutralized polyacrylic acid, sodium carboxy methyl cellulose, casein and zein. Named "Dimethyl Hydantoin Formaldehyde (DMHF) Resin," the new product is water-white, practically odorless and has a melting range of 59-80°C. It dissolves rapidly in water, in all proportions, to give a solution of low viscosity. A 10 per cent water solution is almost neutral. This product is soluble in methanol, ethanol, ethyl acetate, methylethyl ketone, chloroform, methylene chloride and hot glycerol. It is insoluble in benzine, petroleum ether, diethyl ether, trichoroethylene and carbon tetrachloride. According to the company, DMHF Resin has a high gloss, is adhesive, will not ferment or decompose and is resistant to oils, gasoline and many aromatics.

### Goodyear Medal Award Nominations

The Division of Rubber Chemistry of the American Chemical Society has announced that members may now propose nominees for the award of the Charles Goodyear Medal for consideration by the Medal Committee at the Spring Meeting, which will be held in Montreal, May 15-17. Members who wish to propose a candidate may obtain an outline suggesting the form in which the proposal should be made from Dr. A. M. Neal, Secretary, Division of Rubber Chemistry, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. This form also appears on page V of the January-March, 1956 issue of *Rubber Chemistry and Technology*. The proposal and the proper form should be mailed before April 12. The award is not restricted to persons residing in the United States.

## Non-staining extending oil

# For light-colored rubber




**Iron Pyrophosphate Recipe**
1. GRS-1707
2. Base Polymer (top) and Dutrex Oil Masterbatch (37.5 phr.)

**Sulfoxylate Recipe**
3. Base Polymer (top) and Dutrex Oil Masterbatch (37.5 phr)

Shell Dutrex 33 is an entirely new light-colored, compatible naphthenic extender for butadiene-styrene rubber. The outstanding non-staining, non-discoloring properties of Dutrex 33 are retained in oil masterbatch vulcanizates even after severe sunlight exposure.

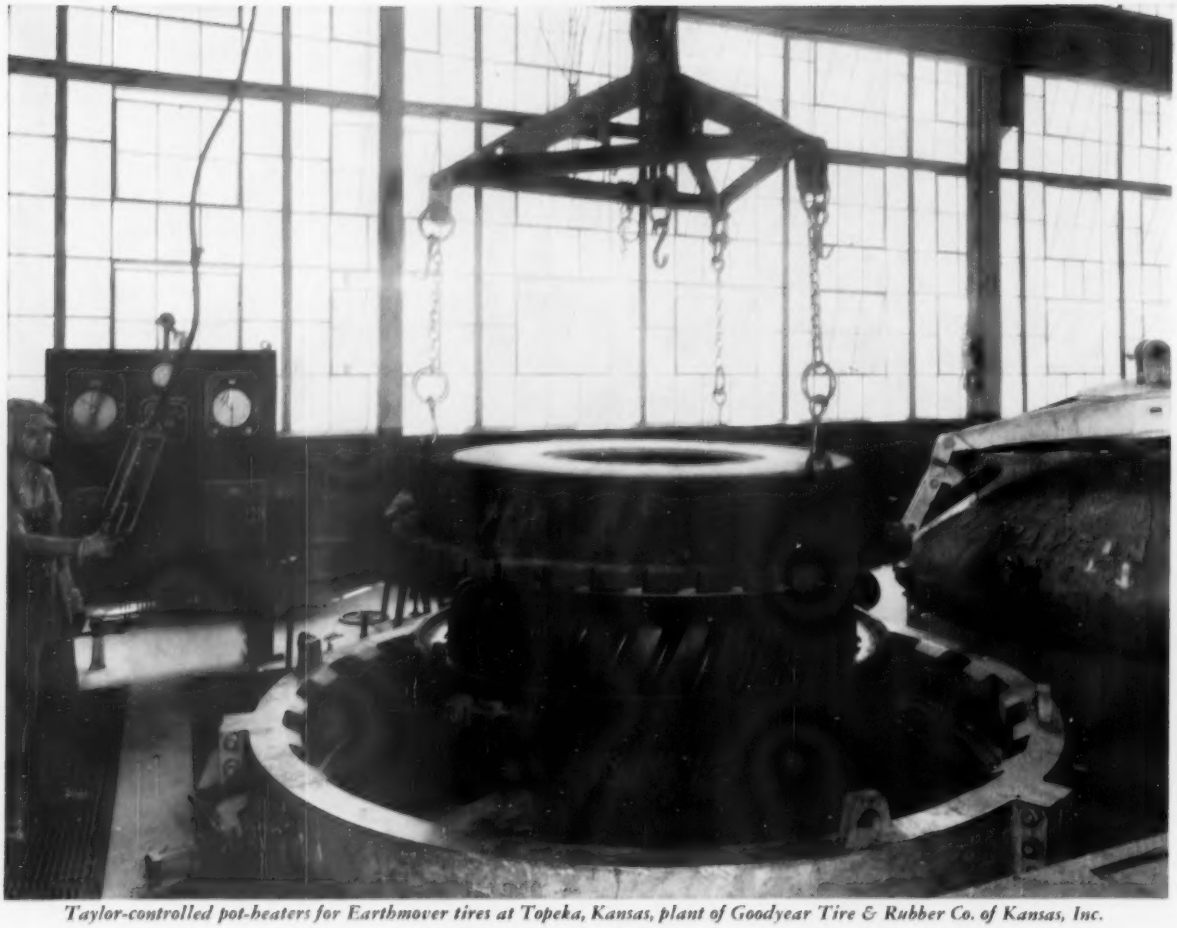
Dutrex 33* provides superior light color in oil masterbatch based on conventional iron pyrophosphate recipes, but its maximum advantages are fully realized in sulfoxylate base polymers. Regardless of recipe, Dutrex 33 is recommended in oil masterbatch for applications where discoloration and contact or migration staining are critical.

For further information write or call Shell Oil Company, 50 West 50th St., New York 20, N. Y., or 100 Bush St., San Francisco 6, California.

*Trademark

# SHELL DUTREX 33

SHELL



*Taylor-controlled pot-heaters for Earthmover tires at Topeka, Kansas, plant of Goodyear Tire & Rubber Co. of Kansas, Inc.*

# Goodyear's tougher with Taylor

GOODYEAR "Earthmovers" are tougher because of Taylor precision controls on their pot-heaters. That's important because these 1600-lb. tires must carry mammoth loads and travel at speeds unknown to old-fashioned earth-moving equipment.

Goodyear officials say: "Properly controlled cure of Earthmover tires has first preference in the design of equipment." This meant ±1 degree in temperature . . . this meant ±1% in time . . . this meant Taylor Control Systems for fully automatic timing and temperature.

A Taylor FULSCOPE* Temperature Controller regulates the temperature. The complete cure is precision-timed by two Taylor FLEX-O-TIMERS*—a sequence timer for a range from two to 192 minutes and a cure timer having a range from 18 to 1,440 minutes.

## THIS FULLY AUTOMATIC TIMING MEANS:

**1. Improved tire quality**—the automatic cure cycles *are uniform.*

**2. Improved plant efficiency**—automatic cure timing permits *closer scheduling of heats,* reduces idle time of equipment and operators.

**3. Reduced processing costs**—there's *no need for a "steam-tender"* to time curing stages.

The man to suggest what Taylor Control Systems can mean in your plant is your Taylor Field Engineer. Or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

*Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.*

*Reg. U.S. Pat. Off.

**Taylor Instruments**
**MEAN**
**ACCURACY FIRST**
**IN HOME AND INDUSTRY**

*In a Hurry for...*

**Carbide Silicones**

**Maglite® "D"**

**Stabilite®**

**Colors** rubber or plastic

**Ester Plasticizers**

# Call Hall

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## Overseas

*by Comtel-Reuter*

**Singapore**—Singapore and the Federation of Malaya exported 92,182 tons of prepared latex in 1956 compared with 107,806 tons in 1955, according to local authorities. Of the total 1956 shipments, the United Kingdom took 26,282 tons; the United States took 27,605 tons; West Germany took 9,320 tons, and France took 6,027 tons.

—•—

**Kottayan** (India)—The Indian Rubber Board has decided to request the government to fix the quota of rubber imports for 1957 in the light of increased consumption and lesser production figures estimated during the year. The Board also decided to divide the import quota allowed for 1957 between the first and second half of the year in the ratio of 65:35 and to allocate the quantity among the manufacturers on a pro rata basis of their consumption during 1956.

—•—

**Liverpool**—Raw rubber for shipment to Russia is being loaded at this port for the first time since last November. Liverpool dockers lifted their ban on the loading of rubber for shipment to Russia which had been holding up between 4,000 and 5,000 tons of rubber. The ban was originally called in protest against Russian action in Hungary.

—•—

**Kuala Lumpur**—Malaya's 320,000 rubber plantation workers will get an average wage increase of 33 cents a day (Straits) in 1957 as a result of the steady increase in the price of rubber over the past three months. Under a workers' agreement with employers, pay rates are fixed according to the average rubber price during the previous quarter. The new increase will cost the industry an estimated $8 million (Straits) during the first quarter of 1957.

—•—

**Colombo**—Rubber traders in Ceylon have welcomed the terms of the price agreement signed recently between Ceylon and China covering the annual exchange of 50,000 tons of rubber for 270,000 tons of rice under the five-year rubber-for-rice agreement between the two countries. A spokesman for the rubber trade said the terms were "generous" considering that sheet rubber was already available to China from Malaya. The new price schedule will be in operation during 1957, the final year of the five-year Sino-Ceylon barter agreement.

—•—

**Ankara**—A law introducing a new tax on new products in order to open up a new source of public revenue will become effective in Turkey on March 1. Products listed include rubber and rubber manufactures. Dues will range up to 40 per cent of the value and will have to be deposited by importers at the Turkish Central Bank.

—•—

**Kuala Lumpur**—The Malayan rubber industry faces a bleak future unless it competes with the price of synthetic rubber, the secretary of the Associated Chinese Chambers of Commerce of Malaya said recently. He warned that something will have to be done to meet competition from synthetic rubber before all markets went over to synthetic.

**Quito**—The Ecuadoran Rubber Co. has announced that it will build a tire factory in Cuenca which should be ready to start production by the end of this year. The company also reports that it has contracted for the technical services of the General Tire & Rubber Co. and has permission to use that company's trademarks.

—•—

**The Hague**—Cargo ships barred from the blocked Suez Canal may be saved a journey of thousands of miles around the cape if a "landlift" announced by the Israel legation is put into operation. The legation said that international shipping companies and the Israeli customs and railway authorities had worked out a plan to transport European cargoes for Africa and the Far East by an overland route through Israel. Cargoes could be unloaded at Haifa and taken by rail and road to Eilath on the Gulf of Aqaba. Ten European shippers have already agreed to ship goods by this route.

—•—

**Singapore**—Rubber dealers here hope to sell about 75,000 tons of Malayan rubber to Communist China this year. "Informed sources" state that the Peking Government is prepared to purchase 130,000 tons of rubber from southeast Asian countries this year. It is said that Ceylon is unable to meet all of China's requirements because of limited production.

—•—

**Seoul**—Rubber shoe production in Korea averaged 1.6 million pairs per month in the first six months of 1956, a drastic drop from the 1954 average of 2.9 million pairs per month and the 1955 average of 2.0 million pairs per month.

—•—

**Lagos** (Nigeria)—Crude rubber has now been added to the list of items covered by Open General Export Licenses. Hitherto, specific export licenses were necessary for exports of rubber from Nigeria.

—•—

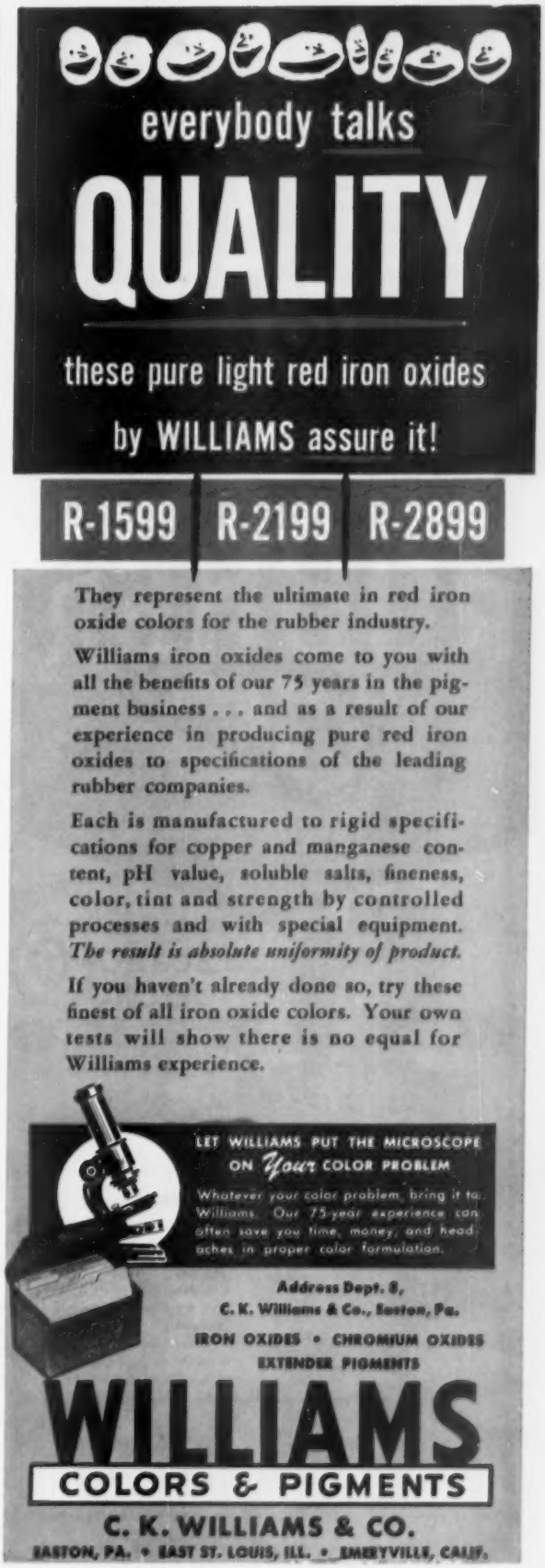
**Kuala Lumpur**—As soon as they are 35 to 40 years old, rubber trees on thousands of acres of rubber plantations in northwest Malaya are to be destroyed to make way for rice planting. The trees had been planted in the country's natural rice belt, according to the Minister for Agriculture. Plantation owners will be asked to surrender the land for rice cultivation in return for new areas for rubber planting.

—•—

**Ibadan** (Nigeria)—The Association of Nigerian Cooperative Exporters is actively striving to encourage producers to improve the quality of various commodities. The improvement of rubber quality in the Benin-Delta provinces is one of the Association's present main campaigns. The Association has called upon the services of an expert from Malaya to assist producers in improving quality from poorly remunerative grades to the more valuable grades.

—•—

**Peking**—China's rubber industry is reported to have reached the target level of output for the first Five-Year Plan. The production level was reached more than a year ahead of schedule. Heavy duty tires, passenger car tires, weather balloons and surgical gloves are included in the 308 kinds of new rubber products successfully trial produced during the Five-Year Plan.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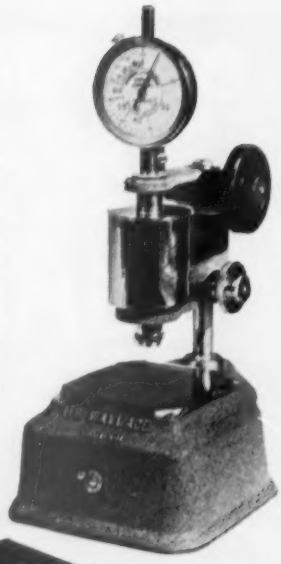

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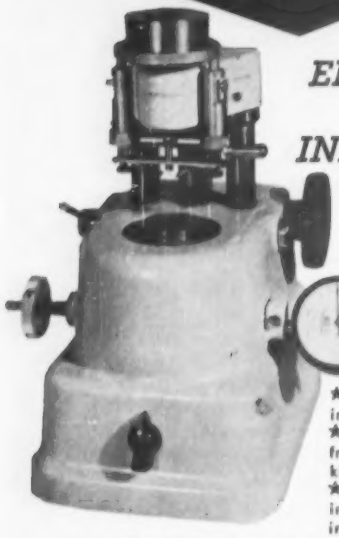

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## New Goods

### Ibsen Aqua-Belt

A new type of inflatable belt for water skiers, designed by Don Ibsen and called the "Ibsen Aqua-Belt", has been developed by Plastimayd Products Corp., 931 S. E. Sixth Ave., Portland 14, Ore. Made of Krene plastic, the belt is light in weight and compactly designed to provide freedom of action. It is worn with the inflated section forward and supports the skier face up in the water. According to the company, the aqua-belt provides extra buoyancy for deep water starts, helps cushion falls, is easy to inflate, put on and take off and serves as a marker, pinpointing the water skier if he should fall. Krene plastic, which is used in fabricating the belt, does not shrink, rot, mildew or become waterlogged. Suitable for use as a seat cushion or pillow, the aqua-belt folds into a compact pocket-sized package when it is not in use. It is available in small, medium and large sizes.

### Extra-Long Discharge Hose

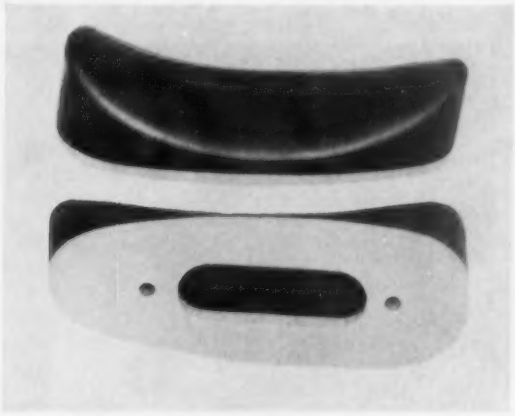
Quaker Rubber Division of the H. K. Porter Co., Philadelphia, Penna., has announced the construction of a discharge hose more than 250-feet long, which, the company believes, is probably the longest continuous hose of its type ever made. The first of several to be manufactured for the government, this hose has an inside diameter of four inches and withstands pressures of 250 pounds per square inch. Brass carrying rings have been built in for ease of handling the more than 800 pound hose.

### Foam Insulated Interlining

Brand and Oppenheimer Inc., 233 4th Avenue, New York, N. Y., has introduced a new insulated interlining, "Fahrenheit," made of foam rubber. The lining is said to be warmer, stronger and lighter than interlinings now on the market and to be free of all bacteria and odor. According to the company, the lining is not bulky and will not mat, shrink or deteriorate to lose its warmth.

## Rubber Recoil Pad

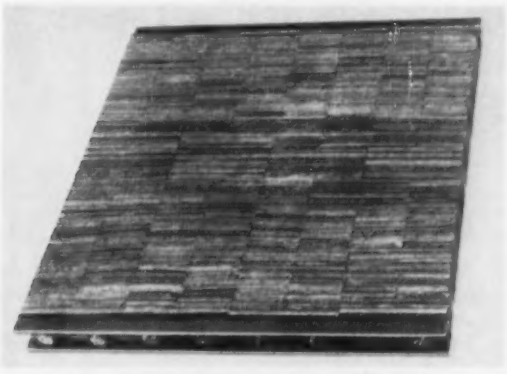
A rubber recoil pad designed for precision made shotguns has been introduced by Darnell Corp., Downey, Calif. The pad, which utilizes Pliolite S-6B, absorbs shock or recoil when a shell is fired and helps to prevent a bruised shoulder. It consists of a yellow, oval section of hard rubber joined to a green, soft rubber piece shaped to the contour of the shoulder. The soft rubber



piece is molded with a smooth exterior surface and hollow center to provide the necessary cushion upon recoil. It is designed to rest comfortably against the shoulder and will not slip when successive shots are fired, the company says. The close fitting pad also allows the shooter to swing his gun for angle shots without riding the edge on his shoulder. Pads are attached to shotgun stocks by means of two screws which are inserted through the soft and hard rubber sections.

## Flex-O Rubber Floor Pads

"Flex-O Rubber Floor Pads", have been introduced by Bumpers, Inc., 2534 Detroit Ave., Cleveland 13, Ohio, to protect products and prevent damage of floors by absorbing the impact of falling loads. Designed for use in industrial areas such as production and assembly



areas and loading docks, the pads may be installed on the floor or recessed into specially built floor pockets. The product is constructed of steel channel frames and laminated segments of resilient rubber reinforced fabric. The pads are built for heavy duty service and are available in two standard sizes.

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| MGO (Ignited Basis) | 97.9% |
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## Uscoweld Pipe Fittings

U. S. Rubber Co., 1230 Avenue of the Americas, New York, N. Y., has developed a paper-thin layer of plastic, for use on a section of the inside wall of a new pipe fitting, which promises to eliminate the problem of leaks at joints in cemented or solvent-welded, plastic pipe installations. The plastic layer, only a few thousandths of an inch thick, makes the inner half of the fitting slightly smaller than the outside diameter of the pipe it is used to join. A light coat of solvent base cement on the inside of the fitting and on the pipe end, softens the plastic layer so the pipe can be pushed into place.

According to U. S. Rubber, high contact pressure between pipe and fitting causes a positive weld which is strong enough within seconds for ordinary handling. In about two hours, the solvent-softened plastic in the weld area has completely hardened so the joint is as strong as the pipe itself. The new fitting has a flared entrance leading to the narrow interior section so the pipe can be inserted quickly and easily. The flared opening also aligns the pipe automatically for welding. Called "Uscoweld", the new fittings are made of a styrene-acrylonitrile blend. The same material is used in Uscolite pipe and Uscolite screw-type fittings. A range of Uscoweld fittings for standard size pipe and a half-inch to two-inches in diameter is now being made. A series of fittings for larger diameter pipe is also planned.

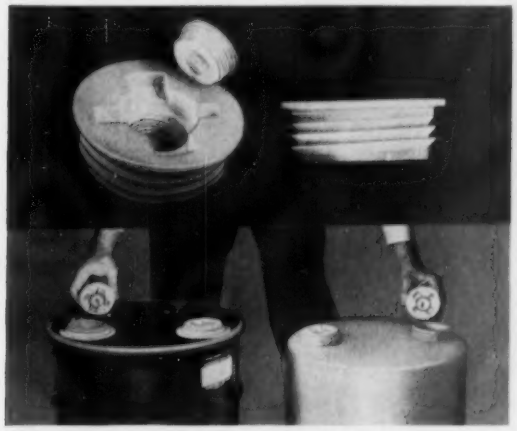
## Kaokork Gasketing Material

F. D. Farnam Co., Chicago, Ill., has developed a gasketing material composed of cork granules and wood fibers bound in a homogenous sheet with Chemigum latex. Called "Kaokork", the material may be produced in a variety of types containing up to 50 per cent of the Chemigum rubber based on total sheet weight. According to the company, the cork and rubber combine to provide maximum compressive properties, while the

wood fibers and rubber provide strength in the sheet. Kaokork may be used in a variety of sealing applications because of its soft, compressive characteristics and because alteration of the ratios of the components in the product permits a varying range of compressibility. Kaokork is available from Farnam in sheet stock up to 100 inches in width and ranging in thickness from 15 to 45 points. Laminated sheets up to ⅛-inch thick are also available. The company is equipped to prepare dies and cut gaskets in production quantities for virtually any application requiring the use of this type of material.

## Polyethylene Drum Plug

Delaware Barrel & Drum Co., Wilmington, Del., has introduced a low-pressure polyethylene closure for the I. C. C. 2-S molded polyethylene drum. The new closure is said to eliminate the possibility of damage to the flange and threads, facilitate filling and emptying and extend the life of the drum by permitting replacement of the plug. The design change features two identical flanges with heavy duty internal buttress threads. Each



flange takes a 2-inch plug—with mating buttress threads—fitted with a pliable polyethylene gasket to insure a leakproof seal. The low-pressure polyethylene plugs, in turn, are molded with ¾-inch standard pipe threads in the center for spigots, valves or pipes. A diaphragm seals the bottom of the ¾-inch opening and is cut away for installing spigots, etc. A standard ¾-inch threaded polyethylene plug seals this opening for shipment and is removed by standard drum wrenches for emptying. The new closure is standard on the 15, 30 and 55 gallon drum and optional for the five gallon drum.

## Vinyl Backed Strapping Tape

Dutch Brand Division of Johns-Manville, 7800 Woodlawn Avenue, Chicago 19, Ill., has introduced a new 250 pound tensile strength strapping tape with a vinyl plastic backing. Number 400 "Strapping Tape" is said to resist abrasion, salt water, acids and alkalies and to be rust, mildew, water, oil and grease proof. A holding power of 68-72 pounds per square inch assures the user of positive adhesion and its flexibility enables the tape to conform to irregular surfaces. According to the company, this new pressure sensitive reinforced tape is suitable for packaging, package reinforcing, bundling, palletizing, unitizing, tear stripping and wherever extra strength at low cost is desirable or necessary. The tape is available in standard widths starting from ¼ inch in 60 yard rolls. Longer lengths are available upon special order. Dutch Brand No. 400 Strapping Tape meets U. S. Federal Specification PPP-T0097a Type II.

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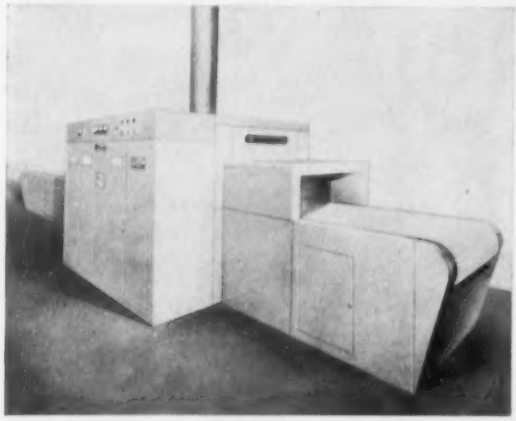
## New Equipment

### Ovens for Drying and Curing Foam Rubber

The development of a complete new line of dielectric ovens applicable to drying and curing of foam rubber in slabs and in the finished state as mattress, cushion or other padding forms, has been effected by the Young Brothers Co., 1831 Columbus Road NW, Cleveland 13, Ohio. Offered in five models of 15, 30, 60, 75 and 150 kw outputs, the new ovens range from 22 to 52 feet in length and are from 6½ to 10 feet high. Dielectric heating occurs when a suitable non-conductive material passes through a field of energy reversing its polarity



several million times a second. This violently agitates the material molecules and the resulting intermolecular friction creates heat quickly and uniformly throughout the material. One advantage dielectric heating is said to have over other methods is that the heat is developed within the material itself. This is in contrast to other methods which rely on heat conduction from the surface to the interior of the material, tending to overheat the surface before the interior is heated thoroughly.

The ovens feature a conveyor system comprising a heavy-duty variable speed drive, a belt of heavy gauge wire mesh (rubber or fabric), adjustable take-up, and ball bearing idler rolls. Use of a load monitor permits heating of a great variety of sizes without constant adjustments. Protection is provided for the power tube against such conditions as over-heating or current overload, and safety for the operator has been assured. Operation, incidentally, is simplified by use of push button controls. Among the advantages claimed for the new dielectric ovens are: extremely rapid, uniform heating with precision control; reduced handling cost and increased labor productivity; substantial savings through fast, efficient production and uniform product quality, and compact, space saving design.

---

A large, tough **stainless steel spatula**, said to be ideal for breaking up chemicals in large bottles and jars, cleaning reaction kettles, and a host of other laboratory tasks, is available from the Fisher Scientific Co., Pittsburgh, Penna. Called the ChemiScraper, it can be used with all but the most powerful reagents without corroding.

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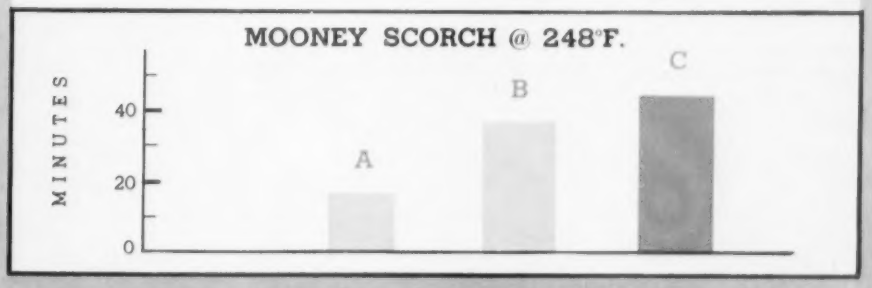


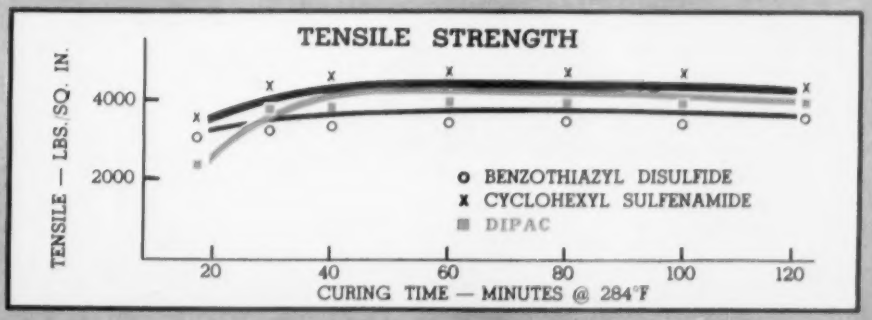


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# PROCEEDINGS of the Third Rubber Technology Conference

Copies of all the papers presented at the Conference held in London on June 22-25, 1954, under the auspices of the Institution of the Rubber Industry, are presented in this volume, together with the discussions on each paper. The papers are world-wide in character and represent the latest thinking in the science and general technology of rubber. This informative volume is a **must** for all who wish to keep abreast of developments in the field.

## TITLES OF PAPERS

**Properties of Natural Rubber Latex**

Micro-Gel in Latex and Sheet Rubber. *R. Freeman.*

Improved Rubbers by the Enzymatic Deproteinization of Skim Latex. *J. E. Morris.*

Stability of Ammoniated Latex and Soap-Stabilized Emulsions in the Presence of Complex Zinc Salts. *T. S. McRoberts.*

Variability of Hevea Latex. *W. L. Resing.*

Zinc Oxide Testing of Latex. *E. W. Madge, H. M. Collier,* and *J. L. M. Newnham.*

Hevea Latex: Its Structure and Viscosity. *G. Verhaar.*

Contribution to the Study of Mineral Elements in Field Latex. *E. R. Beaufils.*

Rubber Peptized on the Plantation. *G. Giger, J. Lemee* and *M. Liponski.*

**Production and Evaluation of Synthetic Rubber**

Cation and Anion Influence in the Alfin Reagent for the Polymerization of Butadiene. *A. A. Morton, I. Nelidow* and *E. Schoenberg.*

Evaluation of Synthetic Rubbers and Latices. *I. D. Patterson.*

Recent Studies on the Structure of Synthetic Rubber. *R. F. Dunbrook, B. L. Johnson, J. L. Binder, J. M. Willis,* and *E. L. Carr.*

Rubbery Copolymers from Unsaturated Ketones. *W. Cooper, T. B. Bird,* and *E. Catterall.*

Preparation and Properties of Condensation Block Copolymers. *D. H. Coffey and T. J. Meyrick.*

Graft Polymers Derived from Natural Rubber. *G. F. Bloomfield, F. M. Merrett, F. J. Popham,* and *P. McL. Swift.*

Oil Resistance of Synthetic Rubbers Over Very Long Periods of Time. *B. Särnö.*

Structure and Solution Properties of High Molecular Weight Butadiene-Styrene Copolymers. *R. B. MacFarlane* and *L. A. McLeod.*

Pyridinium High Polymers—A New Class of Oil-Resistant Synthetic Rubbers. *W. B. Reynolds, J. E. Pritchard, M. H. Opheim,* and *G. Kraus.*

**Chemistry of Rubber**

Studies in Latex Particle Surface Reactions: Kinetics of Hydrochlorination of Unvulcanized and Vulcanized Latices. *M. Gordon* and *J. S. Taylor.*

Oxygen-Absorption Effects in Cured and Uncured Rubber. *R. L. Stafford.*

Infra-Red Spectroscopic Analysis of Elastomers. *W. H. T. Davison* and *G. R. Bates.*

Structural Characteristics of the Sulfur Linkage in Natural Rubber Vulcanizates. *L. C. Bateman, R. W. Glazebrook, C. G. Moore,* and *R. W. Saville.*

Chemical Reactions of Antioxidants Used in Vulcanized Rubber. *P. Schneider.*

Cross-Linking and Radiation Effects in Some Natural and Synthetic Rubbers. *A. Charlesby* and *D. Groves.*

**Physics of Rubber**

Modification of the Permeability of Natural Rubber Vulcanizates. *P. Thirion.*

Reinforcement and Tear Strength Anisotropy. *H. J. J. Janssen.*

Elasticity of Ideal and Real Rubberlike Materials. *H. M. James* and *E. Guth.*

Study of Rubberlike Polymers by Nuclear Magnetism. *B. A. Mrowca* and *E. Guth.*

Natural Rubber Compounds for Intermittent Low Temperature Service. *W. P. Fletcher, A. N. Gent,* and *R. I. Wood.*

Theoretical Model for the Elastic Behavior of Filler-Reinforced Vulcanized Rubbers. *L. Mullins* and *N. R. Tobin.*

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**Developments in Testing Methods**

Tear-Down Adhesion Testing. *B. Pickup.*

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Changes of Electrical Resistance of Rubbers Loaded with Carbon Black. *D. G. Marshall.*

Tire Cord Fatigue and Fatigue Testing. *R. S. Goy.*

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Role of Intermediate Level Carbon Blacks in Rubber. *I. Drogin.*

Role of Particle Diameter and Linkage Formation in Rubber Reinforcement. *A. F. Blanchard.*

Lignin as a Compounding Ingredient for Natural Rubber. *I. Sagajllo.*

Mooney Viscosity of Carbon Black-Rubber Mixtures. *M. Studebaker.*

Oil Extension of Natural Rubber, *G. J. van Amerongen* and *H. C. J. de Decker.*

Behavior of Highly-Filled Rubber Vulcanizates. *K. C. Bryant* and *D. C. Bissett.*

Rubber Reinforcement by Resins Formed in Latex. *J. van Alphen.*

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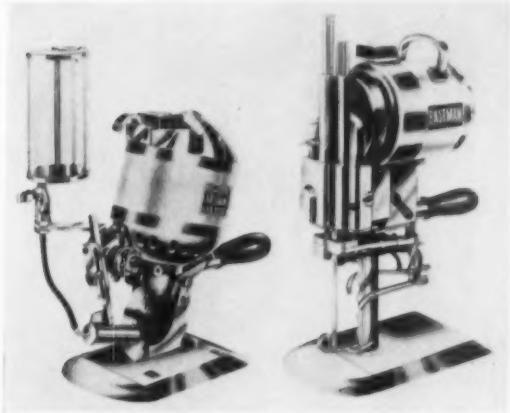
Especially designed for cutting vinyl, polyethylene and other types of films, but adaptable for use with rubberized fabrics, plastic sheeting, and coated and laminated materials in general, two new Plastic Master cutting machines have been introduced by the Eastman Machine Co., 779 Washington St., Buffalo 3, N. Y. The new units—called Blue Streak and Lightning, respectively—are said to overcome such



problems as the fusing of cut edges because of the low melting point of some fabrics, adhesion of chemicals to the cutting knife, etc., by using different motor speeds, various sharpening elements and high-speed steel knives. The Blue Streak unit utilizes a "wave-edge" knife from which some 80% of the cutting edge has been removed to minimize heat and friction, thus eliminating fusing. The new Lightning model features such improvements as permanently lubricated and sealed motor bearings, a special device to lock out line, dust and other particles from the gears, a "forward sweep" plow that keeps threads and ravelings from getting behind the knife, a dirt-proof enclosure around the starter, simple and quick knife replacement, and a smoothly operating sharpener.

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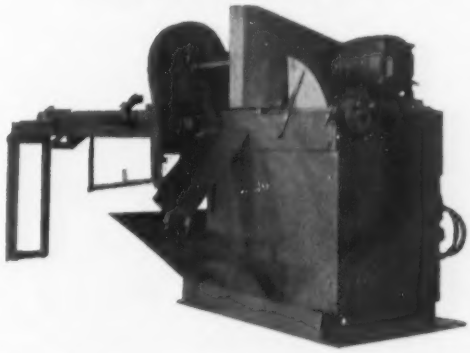

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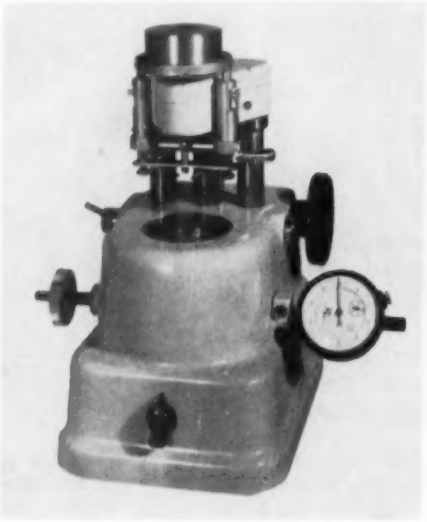
## Measurement of Cure in Polyester Resins

Although there are several methods of determining the degree of cure of the polyester resins, which are assuming a greater degree of importance in the over-all rubber field, the measurement of hardness is one of the most rapid methods. The Electronic Micro Indentation Tester, developed by H. W. Wallace & Co., Ltd., Croydon, England, the function of which is to measure accurately the depth of penetration of an indentor into



material under a known dead load, has been finding increasing usage where these polyester resins are concerned.

The Wallace instrument consists basically of an indentor and a means of applying both minor and major loads to the indentor. The specimen is mounted on a table and indentation is measured by raising the table until the indentor is returned to the exact position it occupied before the major load was applied. It is a comparatively simple matter to measure accurately the amount the table has to be raised and friction in this measuring device is of no consequence. The exact position of the indentor before and after the major load is applied is termed the "null" position, and this is identified most efficiently by means of a simple electronic "null" indicator.

Where the polyester resins are concerned, it has been found that the instrument can estimate the degree of cure of unfilled polyester resins and resins containing glass filler by measuring surface hardness and degree of creep. The scatter of results is greater, however, with the filled resin than with the unfilled resin.

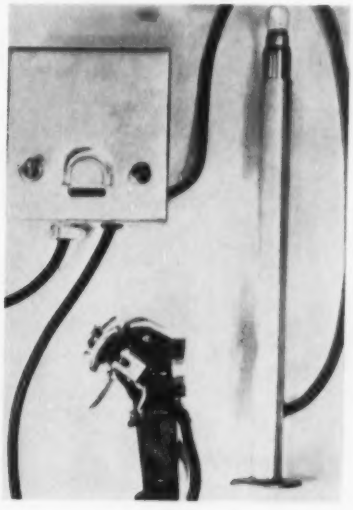
---

Added to the line of automatic skid lifts and skid turners of Southworth Machine Co., Portland, Me., is the **Strongback Lift Table,** designed to elevate skid or palletized loads to correct feeding, working or positioning heights for a variety of machine, process or assembly operations. Platform is 24 x 53 inches, collapsed height 7¼ inches, and capacity 4000 pounds. Lift is 30 inches and operator can effect desired lift from floor level to a height of 37¼ inches in a single stage.

## Tensitron Electric Tension Indicator

As far as it is known, all tension meters produced to date show tension visually only. Now, a novel electrical contacting device, made by Tensitron, Inc., Harvard, Mass., calls the attendant by the flashing of an electric light when tension goes above or below those pre-set limits prescribed for the best operation in rubber, wire and textile plants.

The accompanying illustration shows the tension annunciator as attached to the new Saxl Tension Meter.



Mounted upon an insulating cover, a U-shaped holder on top of the meter holds two tension setting screws with special contact points. They can be adjusted so that the lever tilting between them makes contact at any desired tension. Connected to the sensing lever, in between them travels an electric contact, the position of which is determined by the tension. Filaments are guided over the rollers of the electric tension indicator. A warning light flashes if tension falls below or exceeds the limits of best running conditions.

A transparent cover protects the contacts, which are free from arcing due to a special circuit. The instrument is free from indefinite contacting and contact burnout, despite standard 115-volt operation. All electrical connections are inside the small switch-box shown. On the other side of this box is a flexible cable which feeds a clearly visible indicator lamp on the stand shown, to call maintenance personnel. The electric tension unit is small, light in weight, and can easily be attached from the holes in its handle to any type of frame, the company declares.

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Constant split-second timing can be maintained despite power failures or circuit breaks with the use of a new **electrical instrument timing component**—the Duplex Time Component— patented by Industrial Timer Instruments Co., 189 W. Madison St., Chicago 2, Ill. The device consists of a synchronous electric time unit combined with a spring driven unit held in reserve and ready for instant action, Industrial Timer states.


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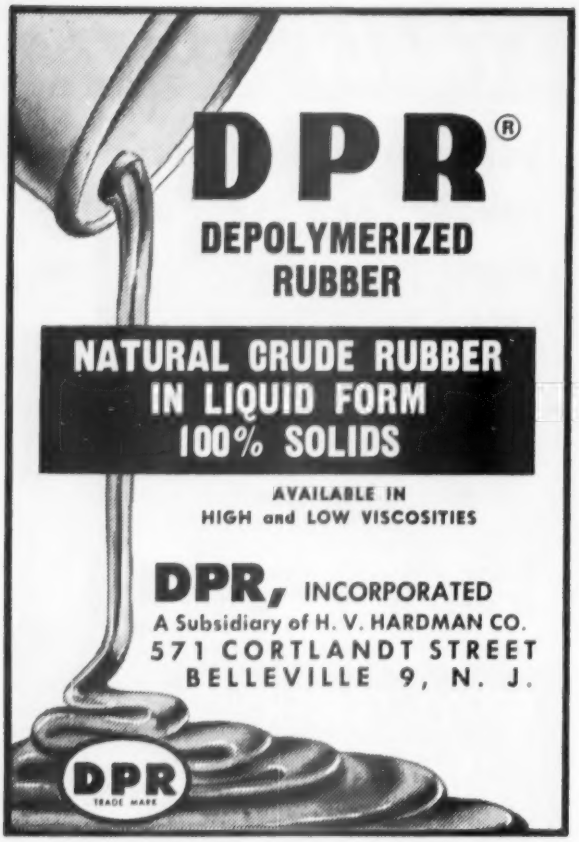


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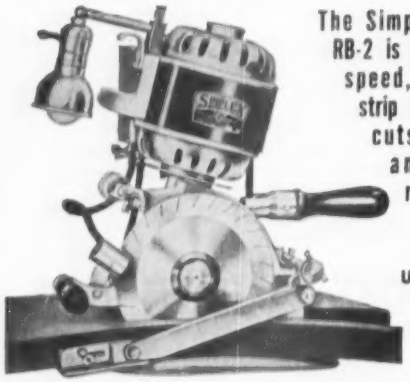

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The new Model RB-2 has a maximum cutting thickness of two inches, weighs 44.5 pounds, and is available in both A.C. and D.C. types. Manually operated, the machine is capable of cutting up to 20,000 feet of rubber strip in eight hours. A series of slits in the edge of the cutting blade carries water from a reservoir into the cut and not just to the top of the rubber being cut. This method lubricates the entire cut and produces a straight and even edge.

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# Reviews

## BOOKS

**Engineering Uses of Rubber.** Edited by A. T. McPherson and Alexander Klemin. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 6 x 9 in. 490 pp. $12.50.

Several books devoted to the engineering applications of rubber and rubberlike materials have been available for many years. Most of these books were valuable contributions to the rubber literature, but they had one common failing, namely, they were in the main along the lines of what rubber is used for. This current book offers a wholly new approach in that it reveals why and how rubber is used and shows how this information can help solve special problems or develop new applications.

Written by eighteen well-known rubber technologists, the work covers four major areas: (1) The manufacture of rubber goods; (2) The properties and behavior of rubber; (3) Applications in different industries; (4) Means of obtaining rubber products. A final brief chapter points out the relation between the new knowledge of the structure of polymers and their rubberlike properties in order to give an indication that at some future date the engineering properties of rubber might be derived from molecular constants rather than from empirical measurements.

Although originally designed by the late Dr. Klemin for the engineer and scientist outside the rubber industry, the book is also of direct value to the rubber technologist. It contains unpublished data and information not readily available in the literature, particularly where the applications of rubber are concerned. Much of the text, however, is especially designed to acquaint materials, mechanical, chemical, electrical and other engineers with the specific properties of rubber of direct interest to their respective fields of endeavor.

The book has 16 chapters in all, including an introduction by the late Ernst A. Hauser and the final chapter on rubberlike materials referred to above. The other 14 chapters and their authors include: Making Rubber Products for Engineering Uses, *E. G. Kimmich;* Compounding, *G. C. Maassen;* General Engineering Properties of Rubber, *E. G. Kimmich;* Design of Rubber Mountings, *J. F. Downie Smith;* Deterioration of Rubber from Use and with Age, *J. Crabtree and F. S. Malm;* Rubber in Civil Engineering, *W. E. Scoville, Jr.;* Rubber in Chemical Engineering, *B. S. Garvey, Jr.*

Also, Rubber in Electrical Engineering, *G. J. Crowdes;* Tires, *R. H. Spelman;* Belt Conveyors, *Paul D. Suloff;* Rubber in Automobiles, *J. W. Marshall;* Rubber and Aviation, *J. J. Allen, R. W. Wixom and H. C. Chandler, Jr.;* Specification and Inspection of Rubber Products, *W. J. McCortney and W. J. Simpson;* Rubber Products for New or Special Purposes, *E. F. Riesing and J. E. Gieck.* There are also author and subject indexes provided in this interesting book.

•

**Quality Control for Plastics Engineers.** Edited by L. M. Deibing. Published by the Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 6 x 9 in. 142 pp. $4.95.

This book is the first in a series of technical volumes, to be sponsored by the Society of Plastics Engineers. As indicated by its title, it is devoted to a frank discussion of the need and means for quality control of all types of plastics. It is evidence of the serious work carried out in recent years by the Society's Committee on Statistical Quality Control. The book is divided into ten sections covering, respectively, the use of frequency distributions in plastics molding, the normal frequency of distribution, control charts for variables, controls charts for attributes, specifications for use under statistical quality control, sampling inspection, statistical correlation, process capability analysis, significance, and statistical experiments in plastics fabrication. There is also a subject index. Although devoted specifically to the problems of the plastics industry, this work, in a sense, may be regarded as a manual on statistical quality control problems and their solution.

**Annual Report on the Progress of Rubber Technology: 1955.** (Volume XIX). Published by W. Heffer & Sons Ltd., Cambridge, England, for the Institution of the Rubber Industry, 4, Kensington Palace Gardens, London, W. 8.

(Available from Book Department, RUBBER AGE)

Each succeeding year the rubber manufacturing industry has additional reason to be appreciative of the efforts of the Institution of the Rubber Industry for publishing its reports on the progress of rubber technology. The report for 1955, like its predecessors, covers the various segments of the rubber industry comprehensively. Each of the contributing authors is an expert in his field. Beginning with a historical and statistical review, the report goes on to cover almost every facet of rubber technology. A good deal of interesting information appears on such subjects as: Planting and Production of Raw Rubber and Latex; Properties, Applications and Utilization of Latex; Chemistry of Raw and Vulcanized Natural Rubber; Physics of Raw and Vulcanized Natural Rubber; Synthetic Rubber; Testing and Equipment and Specifications Other Than for Latex; Compounding Ingredients; Fibers and Fabrics; Tires; Belting; Hose and Tubing; Cable and Electrical Insulation; Footwear; Mechanical Rubber Goods; Games, Sports Accessories, Toys; Surgical Goods; Textile-Rubber Composites, Solvents and Cements; Cellular Rubber; Hard Rubber; Flooring; Works Processes and Materials; Machinery and Appliances, and Roads. Excellent subject and author indexes facilitate the location of needed information.

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**Commercial Waxes.** (Second Edition). Edited by H. Bennett. Published by the Chemical Publishing Co., Inc., 212 Fifth Ave., New York 10, N. Y. 5½ x 8½ in. 698 pp. $15.00.

This is an enlarged and revised edition of a book which met with much success in its earlier edition. Much additional information has been included on natural and synthetic waxes, wax blends and wax-resin compositions. A substantial part of the data has not been published before and the balance has been compiled from many different technical publications. Mineral, vegetable, animal, synthetic and compounded waxes are covered in detail and numerical data on their physical and chemical properties, solubilities and uses are listed in all cases. Over 160 tables list important data on the physical and chemical properties of waxes, such as melting point, specific gravity, hardness, purity, fracture and form, moldability, adhesiveness, solubility, penetration, surface tension, compatibility, waterproofness, acid, iodine, saponification and ratio numbers, etc. More than 60 graphs show at a glance the relationships of physical properties, effects of adhesives, etc. The book also includes a symposium with contributions by many experts and leading manufacturers. Its wax formulary embraces hundreds of formulas from every branch of the chemical industries. In this regard, several interesting rubber compounds are shown. Under a chapter headed "Waxes in Industry", there appears a general accounting of the use of waxes in rubber.

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**Engineering Inspection Manual.** By Henry A. Roy. Published by the Chemical Publishing Co., Inc., 212 Fifth Ave., New York 10, N. Y. 5½ x 8¾ in. 160 pp. $5.75.

A valuable aid to inspectors engaged in machine tool and other mechanical inspection, this book is based upon the author's experience first as an inspector and then as chief inspector in several leading machinery manufacturing firms. It tackles every phase of inspection intelligently, avoiding unnecessary details, but emphasizing all the procedures which contribute to quality control and efficiency. The book illustrates and describes every important inspection method and gives actual situations, short cuts, and rule-of-thumb procedure. Tables, graphs, flow charts and photographs are used to good advantage. A handy glossary is furnished.

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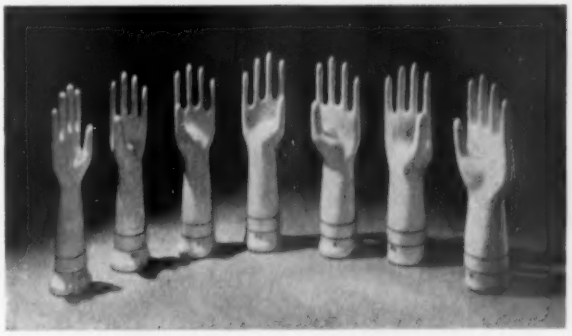

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## BOOKLETS, CATALOGS, etc.

**Synthetic Organic Chemicals—United States Production and Sales: 1955.** (Report No. 198: Second Series). Published by the U. S. Tariff Commission, Washington, D. C. Available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. 6 x 9 in. 188 pp. $.65.

This report comprises three major sections: chemical raw materials, cyclic intermediates, and finished synthetic organic chemical products. The first section on chemical raw materials and related products includes statistics on tar, tar crudes, and crude chemicals derived from petroleum and natural gas. The second section offers pertinent data on the cyclic intermediates, rubber processing chemicals, elastomers and plasticizers. The third section offers an alphabetical list of individual products, by groups, and the names of manufacturers. Statistics are playing an ever-greater use in industry calculations and an accurate compilation for any one year will often give much useful background in planning ahead. It is to be hoped, however, that future editions of this valuable report will be presented in a form which is a little easier to read.

•

**Improving Human Relations.** National Association of Manufacturers, 2 East 48th St., New York 17, N. Y. 6 x 8½ in. 32 pp. $.50.

The NAM, in this booklet, presents an action program which is designed to help top management develop better supervisor-employee relations in the plant, and thus step up productivity. Pointing out that the success of a company rests heavily on how well the management group performs in achieving person-to-person understanding, the booklet emphasizes that the supervisor, as a member of management, must "listen" to employees and understand their needs and wants. The booklet points up the possibilities of getting cooperation and building good work habits through the wide use of praise and a "pat on the back" where warranted (as distinguished from flattery). It urges genuine interest in employees as individuals, apart from their function as "producers." Practical steps to guide management in giving foremen and other supervisors the kind of training, education, and support they need to fulfill their vital function are offered.

•

**Krene Cast Vinyl Film.** Bakelite Co., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 20 pp.

The clarity and toughness of vinyl film made by the casting method is demonstrated in this booklet which also describes the uses and properties of the material. A summary of the properties of Krene cast film in 12 formulations is given to indicate its usefulness in a wide variety of applications. Technical information on the superior tensile strength and elongation, outstanding chemical resistance and excellent tear strength of these materials is offered, and the ease of sealing and printing on cast film described. Spectrophotometric curves and graphs present evidence of the excellent clarity and high degree of imperviousness to moisture vapor and common gases possessed by Krene cast vinyl films. Bound into the booklet is a nearly invisible leaf of the film.

•

**Tested By Time.** Harshaw Chemical Co., 1945 East 97th St., Cleveland 6, Ohio. 8½ x 11 in. 88 pp.

The purpose of this attractive, hard-covered book is to give the reader a brief but comprehensive view of the present day Harshaw Chemical Co., its people, plants, products, and the use to which these products are put. Liberally illustrated, this interesting publication attempts to tell the story behind each item of company manufacture, and to give an over-all impression of the company's facilities. The company's activities with such products as catalysts, ceramics, crystals, driers and metallic soaps, fluorides, glycerine, pigments, etc., are covered. The company's activities in such fields as electroplating and in the distribution of reagent chemicals, laboratory apparatus and equipment are also covered.

**Technical Seminar on Synthetic Latex Polymers.** Chemical Division, Goodyear Tire & Rubber Co., Akron, Ohio. 8½ x 11 in. 48 pp.

On May 4, 1956, the Chemical Division of the Goodyear Tire & Rubber Co., presented a Technical Seminar on Synthetic Latex Polymers at the Georgia Institute of Technology. The purpose of the seminar was to provide in as concise and concentrated a form as possible a basic understanding of synthetic latices to members of the textile, paint, paper and related industries. It was hoped that the seminars might also arouse interest in the development of new applications for latex in these industries. The papers which were presented at the seminar have now been collected and published in this booklet. Papers included in the booklet are on such subjects as: "The Synthetic Latex Industry"; "Theoretical Considerations of Polymerization and Latex"; "The Course of a Product Development"; "Properties of Latex Systems and Evaluation Procedures"; "The Influence of Latex Variants on Important Performance Characteristics"; "Sources of Materials for Latex Manufacture"; "The Production of Synthetic Latex"; "Types of Latex Commercially Available", and "A Survey of Latex Applications and Potentials".

•

**Evaluation of Carbon Black Dispersion in Polyethylene Masterbatches.** (Technical Service Laboratory Bulletin). Special Blacks Division, Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass. 8½ x 11 in. 7 pp.

A procedure for the direct determination of the degree of carbon black dispersion in polyethylene masterbatches is described in this bulletin. The method permits the evaluation of carbon black dispersion in compositions containing as much as 30% by weight of the finest particle size carbon blacks. The bulletin first describes the commonly-used squeeze-out method and cites its disadvantages. Procedure using a microtome is then detailed, and evaluation of dispersion given, aided by illustrations comparing results of the two methods.

•

**Manufacturers Wire Handbook.** Pittsburgh Steel Co., Grant Building, Pittsburgh 30, Penna. 6 x 9 in. 120 pp.

This new handbook contains information on the company's wire products and features almost 100 types of wire. Specific sections are devoted to spring wire, ACSR core wire, strand wire, rope wire, high carbon specialties, shaped wire, cold heading and forging wire, welding quality wire, industrial wire, and specialty wires, the latter include tire bead wire. Size range, weights, tensile strength and chemical composition are listed for each type. A special section includes a hardness conversion chart and various tables dealing with torsion and breaking strength, gage systems, tensile strength, etc. A glossary defines a dozen of the most commonly-used terms in the handbook, both technical and semi-technical.

•

**Alco Oil & Chemical Products.** Alco Oil & Chemical Corp., Trenton Ave. and William St., Philadelphia 34, Penna. 8½ x 11 in. 8 pp.

The products manufactured by the company and their application are discussed in this two-color bulletin. Among the products covered are wetting agents, latex compounds for upholstery and carpets, ultra-accelerators, rubber compounding materials, latex compounds for foam rubber production, and stabilizers and thickeners. The properties of the various materials are outlined and illustrations depict their uses in industry.

•

**Mooney Shearing Disc Viscometer: Model STI.** Scott Testers, Inc., 101 Blackstone St., Providence, R. I. 8½ x 11 in. 4 pp.

This folder presents information on the new Model STI Shearing Disc Viscometer available from Scott Testers. Features of the new design are listed, including power closure, gear box, vertical shaft, rotor stem, platens, heating system, heat transference and the measuring system. An illustration of the Model STI is included.

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# MARKET REPORTS

TRENDS
NEWS
PRICES

## Natural Rubber

Since our last report (December 31), the price of spot rubber on the New York Commodity Exchange has moved in the rather large range of 663 points, high for the period being 37.38c reached on January 2, and low being 30.75c reached on January 22. The average price of spot rubber for the month of January was 33.32c based on 22 trading days. This compares with an average of 37.01c in the previous month.

It is reported by the trade that the situation in Europe, involving gas rationing, and lessened optimism on automobile sales in the United States, has sharply depressed natural rubber prices, bringing them back close to their pre-Suez levels. Primary among the factors behind the price drop in rubber is the cutback in automobile production, both here and in Europe, leading to reduced tire consumption. Statistics show automobile production in the U.S. declined in the first two weeks of 1957 from the like 1956 period, and truck and coach assembles were also reported as being lower.

The Suez-imposed oil shortage in Europe not only has reduced automobile and tire usage, it has resulted in sharp automobile production cutbacks. Although Suez has hurt rubber demand in Europe, its major effect has been to delay transmission of supplies.

### Synthetic Rubber Impact

It is reported that the growing usage of synthetic rubber is another reason why prices for natural have been lacking support. Synthetic rubber prices have held steady throughout natural rubber price advances and declines. Recently announced price cuts in styrene, which go into effect about the middle of this year, may bring about lower synthetic prices. This factor may tend to further complicate the natural-synthetic situation.

The re-opening of the Suez Canal, however, with consequent relief of pressure on European oil supplies, may serve to bolster the natural rubber market. To this factor may be added the knowledge that automobile production in the U. S. will be on the rise in the Spring.

The current natural rubber situation and the depressed price situation are bound to have a profound influence on Far Eastern producers. Had rubber prices remained high, there was every indication that producers would exert all their efforts to keep production high. The present conditions, according to many in the trade, are not conducive to high production, and it now appears that natural rubber production may decline in 1957.

### Complicated Foreign Situation

On the reverse side of the coin, there are those who state that depressed natural rubber prices will tend to stimulate consumption of natural in Europe, and this will work to the detriment of synthetic rubber. It must be said that there are as many opinions as there are persons actively engaged in the industry. The end results will probably discount the short-range difficulties, and final figures for 1957 will likely follow the general trend established in previous years.

*NEW YORK, JANUARY 31, 1957*

## Price Data

**Closing Rubber Prices on New York Commodity Exchange**

**FROM JANUARY 1 TO JANUARY 31**

| Jan. | Spot | Jan. | Mar. | May | July | Sales |
|---|---|---|---|---|---|---|
| 1 | .... | .... | .... | .... | .... | ... |
| 2 | 37.38 | 37.40 | 37.35 | 36.55 | 36.00 | 61 |
| 3 | 36.88 | 36.90 | 36.80 | 36.00 | 35.50 | 149 |
| 4 | 36.88 | 36.80 | 37.00 | 36.15 | 35.80 | 132 |
| 5 | .... | .... | .... | .... | .... | ... |
| 6 | .... | .... | .... | .... | .... | ... |
| 7 | 35.25 | 35.05 | 34.75 | 34.00 | 33.70 | 294 |
| 8 | 35.63 | 35.40 | 35.15 | 34.40 | 34.05 | 356 |
| 9 | 34.25 | 34.00 | 33.95 | 33.45 | 33.10 | 489 |
| 10 | 34.50 | 34.55 | 34.30 | 33.75 | 33.35 | 186 |
| 11 | 33.75 | 33.65 | 33.60 | 33.16 | 32.75 | 108 |
| 12 | .... | .... | .... | .... | .... | ... |
| 13 | .... | .... | .... | .... | .... | ... |
| 14 | 32.63 | 32.50 | 32.35 | 31.90 | 31.65 | 425 |
| 15 | 33.25 | 33.20 | 33.20 | 32.75 | 32.40 | 288 |
| 16 | 33.63 | 33.65 | 33.55 | 33.10 | 32.80 | 109 |
| 17 | 32.25 | 31.85 | 31.85 | 31.50 | 31.10 | 298 |
| 18 | 31.50 | 31.00 | 30.90 | 30.50 | 30.10 | 377 |
| 19 | .... | .... | .... | .... | .... | ... |
| 20 | .... | .... | .... | .... | .... | ... |
| 21 | 31.75 | 31.65 | 31.60 | 31.05 | 30.65 | 57 |
| 22 | 30.75 | 30.70 | 30.65 | 30.05 | 29.65 | 294 |
| 23 | 31.38 | 31.70 | 31.30 | 30.65 | 30.35 | 159 |
| 24 | 32.00 | 32.30 | 32.10 | 31.35 | 31.10 | 228 |
| 25 | 31.88 | 31.80 | 31.75 | 30.90 | 30.60 | 98 |
| 26 | .... | .... | .... | .... | .... | ... |
| 27 | .... | .... | .... | .... | .... | ... |
| 28 | 31.50 | 31.60 | 31.60 | 30.99 | 30.60 | 213 |
| 29 | 32.00 | 31.40 | 31.95 | 31.35 | 31.00 | 149 |
| 30 | 32.00 | 31.85 | 31.30 | 30.95 | 30.60 | 110 |
| 31 | 32.00 | 31.85 | 31.35 | 31.00 | 30.65 | 57 |

### Outside Market

| | |
|---|---|
| No. 1 Ribbed Smoked Sheets: | |
| Spot | .32 |
| March | .32 |
| April | .31⅝ |
| Thin Latex Crepe: | |
| Spot | .37¼ |
| Thin Brown Crepe, No. 2 | .28½ |
| Flat Bark Crepe | .21¼ |

### London Market
(Standard Smoked Sheets)

| | |
|---|---|
| Mar. | 31.33 - 31.62 |
| Apr.-June | 31.33 - 31.48 |

### Singapore Market
(Standard Smoked Sheets)

| | |
|---|---|
| Feb. | 30.46 - 30.53 |

### Middling Upland Quotations

| | Dec. 31 | January 31 | | |
|---|---|---|---|---|
| | Close | High | Low | Close |
| Mar. | 34.00 | 34.88 | 34.83 | 34.87 |
| May | 34.00 | 34.82 | 34.75 | 34.82 |
| July | 33.74 | 34.30 | 34.23 | 34.29 |

## Notes & Quotes

Business men who rely on guesswork and intuition may face a bleak future, according to Guy Gundaker, Jr., vice-president of the B. F. Goodrich Tire Co. Mr. Gundaker states that business today must set long range plans based on proved statistics. "In modern sales management the days of guess and intuition are numbered. There will always be room for good judgment, but judgment can no longer be a substitute for facts," Mr. Gundaker declared. "Our population growth, changes in our living and working habits, and the nation's fast technological advancement are important signals to alert businessmen. They cannot afford to overlook the fact that nearly one-third of all present families in the United States have been formed during the past ten years."

## Synthetic Rubber

Most authorities agree that over-all new rubber consumption in the United States in 1957 will hit 1,510,000 long tons. Some 950,000 long tons of this total, it is estimated, will be synthetic rubber. This means that synthetic rubber will account for something like 63% of total consumption in the United States in 1967, compared with the 61% share it held in 1956.

The 950,000 long tons of synthetic estimated to be consumed in 1957 represents a gain of 8% over the 880,000 long tons consumed in 1956. If we accept these estimates, we see that natural rubber's share of the market will drop to 37% in 1957. The tonnage of natural rubber consumed in 1957, however, will remain where it was in 1956 at about the 560,000 long ton mark.

### Overall-all Consumption on Rise

The situation as it presents itself shows that while over-all consumption in the United States and, indeed, throughout the world is on the rise, synthetic rubber continues to take the lion's share of the market. It has been estimated that by 1960, the U.S. will be consuming 1,625,000 long tons of new rubber a year, It is also estimated that by 1960 synthetic rubber's share of this total will amount to 65%. This will leave natural rubber with about the same 560,000 long tons it had in the 1956 and 1957 periods.

Should synthetic rubber's share of the total rise to 75%, as has been suggested in some quarters, natural rubber would account for about 400,000 long tons of the total consumed by 1960.

In consideration of the many factors, both political and economic, which tend to becloud any estimates, it may be argued that the aforementioned figures are speculative in the extreme. Many in the trade state, however, that these "guesstimates" are based on historical patterns. Should the world remain at peace, it is said, the projections would prove themselves to be fairly accurate.

### Natural Production Stable

It is not expected that there will be any major expansion in natural rubber production by 1960. If world requirements for new rubber continue to grow at the present pace, the gap between supply and demand can only be filled by synthetic rubber.

The disinclination on the part of foreign consumers to use synthetic rubber may be overcome by the realities of the situation. Notwithstanding the technical advancements made in natural rubber in the past few years, it is argued that natural will assume the status of a "specialty" rubber, sold at premium prices to meet specific requirements.

It may be that the short-range difficulties of the Suez situation have tended to confuse a true evaluation of the natural-synthetic supply situation. It should be reported, nevertheless, that many in the trade feel that synthetic rubber will play an increasingly greater part in new rubber consumption and that natural's role will be less significant.

Photo by
Constance Bannister

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# PRICES OF COMMERCIALLY AVAILABLE SYNTHETIC RUBBER POLYMERS

*(dry types—per pound carload unless otherwise specified)*

### Butadiene-Acrylonitrile Types

| | |
|---|---|
| **Butaprene NAA** | .5400 [1] |
| **Butaprene NF** | .4900 [1] |
| **Butaprene NL** | .5000 [1] |
| **Butaprene NXM** | .5800 [1] |
| **Chemigum N1** | .6400 [2] |
| **Chemigum N3** | .5800 [2] |
| **Chemigum N5** | .5800 [2] |
| **Chemigum N6** | .5000 [2] |
| **Chemigum N7** | .5000 [2] |
| **Hycar 1001** | .5800 [2] |
| **Hycar 1002** | .5000 [2] |
| **Hycar 1014** | .6000 [2] |
| **Hycar 1041** | .5800 [2] |
| **Hycar 1042** | .5000 [2] |
| **Hycar 1043** | .5000 [2] |
| **Hycar 1312** | .5000 [2] |
| **Hycar 1411** | .6200 [2] |
| **Hycar 1432** | .5900 [2] |
| **Hycar 1441** | .6200 [2] |
| **Paracril AJ** | .4850 [2] |
| **Paracril B** | .5000 [2] |
| **Paracril BJ** | .5000 [2] |
| **Paracril BLT** | .5000 [2] |
| **Paracril C** | .5800 [2] |
| **Paracril CV** | .5900 [2] |
| **Paracril D** | .6500 [2] |
| **Paracril 18-80** | .6000 [2] |
| **Polysar Krynac 800** | .5000 [2] |
| **Polysar Krynac 801** | .5800 [2] |
| **Polysar Krynac 802** | .5000 [2] |
| **Polysar Krynac 803** | .5000 [2] |

### Butadiene-Styrene Types

| | |
|---|---|
| Ameripol 1000 | .2410 [2] |
| **Ameripol 1001** | .2410 [2] |
| **Ameripol 1002** | .2435 [2] |
| **Ameripol 1006** | .2410 [2] |
| Ameripol 1007 | .2425 [2] |
| Ameripol 1009 | .2475 [2] |
| **Ameripol 1500** | .2410 [2] |
| **Ameripol 1501** | .2410 [2] |
| **Ameripol 1502** | .2410 [2] |
| **Ameripol 1703** | .2060 [2] |
| **Ameripol 1705** | .2035 [2] |
| **Ameripol 1707** | .1910 [2] |
| Ameripol 1708 | .1910 [2] |
| **Ameripol 1710** | .1885 [2] |
| **Ameripol 1712** | .1885 [2] |
| ASRC 1000 | .2410 [2] |
| ASRC 1001 | .2410 [2] |
| ASRC 1004 | .2410 [2] |
| ASRC 1006 | .2410 [2] |
| ASRC 1018 | .2700 [2] |
| ASRC 1019 | .2650 [2] |
| **ASRC 1500** | .2410 [2] |
| **ASRC 1502** | .2410 [2] |
| ASRC 1503 | .2625 [2] |
| ASRC 1703 | .2060 [2] |
| ASRC 1708 | .1910 [2] |
| Baytown 1600 | .1760 [2] |
| Baytown 1601 | .1760 [2] |
| Baytown 1602 | .1760 [2] |
| Baytown 1801 | .1600 [2] |
| **Copo 1500** | .2410 [2] |
| **Copo 1502** | .2410 [2] |
| Copo 1505 | .2610 [2] |
| **Copo 1712** | .1885 [2] |
| FR-S 1000 | .2410 [2] |

### Butadiene-Styrene (Cont'd)

| | |
|---|---|
| FR-S 1001 | .2410 [2] |
| FR-S 1004 | .2410 [2] |
| FR-S 1006 | .2410 [2] |
| FR-S 1009 | .2475 [2] |
| FR-S 1010 | .2600 [2] |
| FR-S 1012 | .2425 [2] |
| FR-S 1013 | .2500 [2] |
| FR-S 1014 | .2810 [2] |
| FR-S 1015 | .2910 [2] |
| FR-S 1500 | .2410 [2] |
| FR-S 1502 | .2410 [2] |
| FR-S 1703 | .2060 [2] |
| FR-S 1705 | .2035 [2] |
| FR-S 1712 | .1885 [2] |
| **Naugapol 1016** | .2630 [2] |
| Naugapol 1018 | .2700 [2] |
| **Naugapol 1019** | .2650 [2] |
| **Naugapol 1021** | .3000 [2] |
| **Naugapol 1022** | .2800 [2] |
| **Naugapol 1023** | .2850 [2] |
| Naugapol 1503 | .2625 [2] |
| **Naugapol 1504** | .2950 [2] |
| Philprene 1000 | .2410 [1] |
| Philprene 1001 | .2410 [1] |
| Philprene 1006 | .2410 [1] |
| Philprene 1009 | .2550 [1] |
| Philprene 1018 | .2700 [1] |
| Philprene 1019 | .2650 [1] |
| Philprene 1500 | .2410 [1] |
| Philprene 1502 | .2410 [1] |
| Philprene 1503 | .2625 [1] |
| Philprene 1601 | .1910 [1] |
| Philprene 1605 | .1870 [1] |
| Philprene 1703 | .2060 [1] |
| Philprene 1706 | .2030 [1] |
| Philprene 1708 | .1910 [1] |
| Philprene 1712 | .1880 [1] |
| Philprene 1803 | .1720 [1] |
| Pioflex 1006 | .2410 [2] |
| Pioflex 1500 | .2410 [2] |
| Pioflex 1502 | .2410 [2] |
| Pioflex 1703 | .2060 [2] |
| Pioflex 1710 | .1885 [2] |
| Pioflex 1712 | .1885 [2] |
| Pioflex 1773 | .2060 [2] |
| Pioflex 1778 | .1910 [2] |
| Polysar Kryflex 200 | .2410 [2] |
| **Polysar Krylene** | .2410 [2] |
| **Polysar Krylene NS** | .2410 [2] |
| Polysar Krynol 651 | .1885 [2] |
| Polysar Krynol 652 | .1910 [2] |
| **Polysar S** | .2410 [2] |
| **Polysar S-50** | .2410 [2] |
| **Polysar S-X 371** | .2550 [2] |
| **Polysar SS-250** | .3000 [2] |
| S-1000 | .2300 [2] |
| S-1001 | .2300 [2] |
| S-1002 | .2325 [2] |
| S-1006 | .2300 [2] |
| **S-1011** | .2325 [2] |
| S-1013 | .2300 [2] |
| S-1100 | .1850 [2] |
| S-1500 | .2300 [2] |
| S-1502 | .2300 [2] |
| S-1609 | .1800 [2] |
| S-1601 | .1800 [2] |
| S-1602 | .1800 [2] |
| S-1703 | .1950 [2] |
| S-1706 | .1925 [2] |
| S-1707 | .1800 [2] |

### Butadiene-Styrene (Cont'd)

| | |
|---|---|
| S-1709 | .1775 [2] |
| S-1712 | .1775 [2] |
| S-1801 | .1650 [2] |
| Synpol 1000 | .2410 [1] |
| Synpol 1001 | .2410 [1] |
| Synpol 1002 | .2435 [1] |
| Synpol 1006 | .2410 [1] |
| Synpol 1007 | .2410 [1] |
| Synpol 1009 | .2475 [1] |
| Synpol 1012 | .2425 [1] |
| Synpol 1013 | .2500 [1] |
| Synpol 1061 | .2410 [1] |
| Synpol 1500 | .2410 [1] |
| Synpol 1502 | .2410 [1] |
| Synpol 1551 | .2410 [1] |
| Synpol 1703 | .2060 [1] |
| Synpol 1707 | .1910 [1] |
| Synpol 1708 | .1910 [1] |
| Synpol 1711 | .1900 [1] |

### Butyl Rubbers

| | |
|---|---|
| **Enjay Butyl 035** | .2300 [3] |
| **Enjay Butyl 150** | .2300 [2] |
| **Enjay Butyl 165 NS** | .2400 [2] |
| **Enjay Butyl 215** | .2300 [2] |
| **Enjay Butyl 217** | .2300 [2] |
| **Enjay Butyl 218** | .2300 [2] |
| **Enjay Butyl 268 NS** | .2400 [2] |
| **Enjay Butyl 325** | .2300 [2] |
| **Enjay Butyl 365 NS** | .2400 [2] |
| **Polysar Butyl 100** | .2450 [2] |
| **Polysar Butyl 101** | .2775 [2] |
| **Polysar Butyl 200** | .2450 [2] |
| **Polysar Butyl 300** | .2450 [2] |
| **Polysar Butyl 301** | .2550 [2] |
| **Polysar Butyl 400** | .2450 [2] |

### Neoprene

| | *(prices l.c.l.)* |
|---|---|
| Neoprene Types AC and CG | .5500 [2] |
| **Neoprene Type GN** | .4100 [2] |
| **Neoprene Type GN-A** | .4100 [2] |
| **Neoprene Type GRT** | .4200 [2] |
| **Neoprene Type KNR** | .7500 [2] |
| **Neoprene Type S** | .4200 [2] |
| **Neoprene Type W** | .3900 [2] |
| **Neoprene Type WHV** | .3900 [2] |
| **Neoprene Type WRT** | .4500 [2] |
| Neoprene Type WX | .4100 [2] |

### Silicone Rubbers*

| | *(prices l.c.l.)* |
|---|---|
| GE (compounded) | 2.50 [2] |
| GE Silicone Gum (not compounded) | 4.00 [2] |
| Silastic (compounded) | 1.90 [2] |
| Union Carbide (gums) | 4.00 [2] |
| Union Carbide (compounds) | 2.50 [2] |

### Polysulfide Rubbers

| | *(prices l.c.l.)* |
|---|---|
| **Thiokol Type A** | .4700 [2] |
| **Thiokol Type FA** | .6400 [2] |
| **Thiokol PR-1** | .9500 [2] |
| **Thiokol Type ST** | 1.00 [2] |

## *(latices—all prices per pound dry weight)*

### Butadiene-Acrylonitrile Types

| | |
|---|---|
| **Butaprene N-300** | .4600 [1] |
| **Butaprene N-400** | .5400 [1] |
| **Butaprene N-401** | .5400 [1] |
| **Chemigum 200** | .4900 [2] |
| **Chemigum 235** | .5400 [2] |
| **Chemigum 236** | .5400 [2] |
| **Chemigum 245** | .4600 [2] |
| **Chemigum 246** | .4600 [2] |
| **Hycar 1512** | .4600 [2] |
| **Hycar 1551** | .5400 [2] |
| **Hycar 1552** | .4600 [2] |
| **Hycar 1561** | .5400 [2] |
| **Hycar 1562** | .4600 [2] |
| **Hycar 1571** | .5400 [2] |
| **Hycar 1572** | .5100 [2] |
| **Hycar 1577** | .4600 [2] |
| **Hycar 1852** | .4400 [2] |

### Butadiene-Styrene Types

| | |
|---|---|
| Copo 2101 | .3000 [2] |
| Copo 2102 | .3200 [2] |

### Butadiene-Styrene (Cont'd)

| | |
|---|---|
| Copo 2105 | .3200 [2] |
| Copo X-765 | .3000 [2] |
| FR-S 2000 | .2600 [2] |
| FR-S 2001 | .2600 [2] |
| FR-S 2002 | .2850 [2] |
| FR-S 2003 | .2950 [2] |
| FR-S 2004 | .2950 [2] |
| FR-S 2006 | .2600 [2] |
| FR-S 2105 | .3100 [2] |
| **Pliolite 2101** | .3000 [2] |
| **Pliolite 2104** | .3200 [2] |
| **Pliolite 2105** | .3200 [2] |
| **Pliolite X-765** | .3000 [2] |
| Naugatex 2000 | .2630 [2] |
| Naugatex 2001 | .2630 [2] |
| Naugatex 2002 | .2880 [2] |
| Naugatex 2006 | .2630 [2] |
| Naugatex 2105 | .3120 [2] |
| Naugatex X-765 | .2900 [2] |
| Naugatex X-767 | .3120 [2] |

### Butadiene-Styrene (Cont'd)

| | |
|---|---|
| S-2000 | .2275 [2] |
| S-2004 | .2600 [2] |
| S-2105 | .3100 [2] |
| S-2006 | .2150 [2] |
| S-2101 | .2250 [2] |

### Neoprene

| | |
|---|---|
| Neoprene Latex 60 | .4000 [2] |
| Neoprene Latex 571 | .3700 [2] |
| Neoprene Latex 572 | .3900 [2] |
| Neoprene Latex 601-A | .4000 [2] |
| Neoprene Latex 735 | .3800 [2] |
| Neoprene Latex 736 | .3800 [2] |
| Neoprene Latex 842-A | .3700 [2] |
| Neoprene Latex 950 | .4700 [2] |

### Polysulfide Rubbers

| | |
|---|---|
| **Thiokol Type MX** | .7000 [2] |
| **Thiokol Type WD-2** | .9200 [2] |
| **Thiokol Type WD-6** | .7000 [2] |

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. * Covers a wide range of compounds. Readers are urged to check specific prices with producers.

# MARKETS

(continued)

## Reclaimed Rubber

The Rubber Manufacturers Association estimates that 287,005 long tons of reclaimed rubber were produced in the United States in 1956. During the year, 291 long tons were imported and 14,041 long tons were exported, leaving a net new supply of 273,255 long tons. During 1956, RMA estimates that 271,827 long tons were consumed in the United States. Stocks on hand as of December 31, 1956, RMA estimated, totaled 33,880 long tons.

The production consumption figures for 1956 fall considerably short of the totals set in 1955, when 326,649 long tons were in new supply and 312,781 long tons were consumed. Current estimates of the situation for 1957 hold that this year may be one of the best years for the industry, with final figures approaching 1955 levels. Current prices for reclaimed rubber have been adjusted upward since our last report, as follows:

*(Prices for All Areas Except Calif.)*

| | per lb. |
|---|---|
| Premium Grade Whole Tire | .11½ |
| First Line Whole Tire | .11 |
| Second Line Whole Tire | .10½ |
| Third Line Whole Tire | .10¼ |
| Fourth Line Whole Tire | .09¾ |
| Black Carcass | .15¼ |
| No. 1 Light Colored Carcass | .22 |
| No. 1 Peel | .11 |
| Butyl Tube Reclaim | .14 |
| Natural Rubber Black Tube | .16 |
| Natural Rubber Red Tube | .21 |
| Natural Rubber Gray Tube | .21 |

## Scrap Rubber

The weather at this time of year always tends to complicate the mechanical handling of scrap rubber, adding another impediment to an already slow market. During the period, some activity was noted in black passenger tubes, but this flurry did not last too long. An upsurge in automobile production in the early Spring may bring some small benefits to scrap dealers along the way.

The Rubber Manufacturers Association estimates that 257,894 long tons of scrap rubber were consumed in the United States in 1957. Most dealers are loathe to predict what may lie ahead in 1957. Predicated on past performance, however, 1957 should see the consumption of about 280,000 tons of scrap rubber. Current market prices, as reported by the trade, remain relatively stable.

*(Prices Delivered Akron)*

| | | |
|---|---|---|
| Mixed tires | ton | 16.00 |
| Light colored carcass | lb. | .05½ |
| No. 1 peelings | ton | 45.00 |
| No. 2 peelings | ton | 30.00 |
| **No. 3 peelings** | **ton** | **21.00** |
| **Buffings** | **ton** | **16.00** |
| Truck and Bus S.A.G. | ton | 19.00 |
| **Passenger S.A.G.** | **ton** | **17.50** |
| Natural Rubber Red Tubes | lb. | .07¾ |
| Natural Rubber Black Tubes | lb. | .07 |
| Butyl Rubber Tubes | lb. | .04¼ |

## Tire Fabrics

According to the Textile Economics Bureau, production of tire cord and fabric in the third quarter of 1956 amounted to 103,000,000 pounds, a figure 9% below the 113,000,000 pounds produced in the second quarter and 22% below the 132,000,000 pounds produced in the third quarter of the previous year.

Over this period, there has been a decline in rayon tire cord and fabric production and an increase in the output of nylon tire components. Thus, in the first three quarters of 1955, production of rayon tire cord and fabric aggregated 304,000,000 pounds, and through the first three quarters of 1956, this figure declined by 15% to 258,000,000 pounds. Over the same time span, output of nylon tire cord and fabric increased from 37,000,000 pounds to 47,000,000 pounds, or a rise of 27%.

The production of cotton tire cord (excluding chafer fabric) has dwindled to a level of between 2,000,000 and 3,000,000 pounds per quarter. Cotton chafer fabric output totaled 8,000,000 pounds in the third quarter, which compares with 11,000,000 pounds in the previous quarter and a 1955 quarterly average of about 13,000,000 pounds.

### Price Rise History

There has been some confusion as to current tire yarn prices because of the many changes which have been effected during the past few months. The price increases made on rayon tire yarns began in March, 1956, when Industrial Rayon and American Viscose lowered prices by as much as 6c a pound. Subsequently, all other producers revised their prices downward.

As of early May, most producers were quoting a high tenacity rayon yarn price of 58c; a super-high tenacity price of 61c, and a 63 or 64c price for improved super-high tenacity yarn. In early November, American Enka, American Viscose, DuPont and Industrial Rayon reduced their tire yarn prices by 3c a pound. Shortly thereafter, Beaunit adjusted its prices to the same level. On December 3, American Viscose raised its 200 denier and coarser yarns by 3c a pound, and the following day, American Enka followed suit.

It should be understood that the prices shown below represent an average to which has been added an average cost covering dipping and stretching. Current prices follow:

*(Prices f.o.b. Shipping Point)*

**Rayon Tire Cord**

| | | |
|---|---|---|
| 1100 | lb. | .73 |
| 1650 | lb. | .67 |
| 2200 | lb. | .67½ |

**Nylon Tire Cord**

| | | |
|---|---|---|
| 210 | lb. | 1.95 |
| 840 | lb. | 1.80 |

**Rayon Graded Fabric**

| | | |
|---|---|---|
| 100 | lb. | .69 |
| 1650 | lb. | .63½ |
| 2200 | lb. | .63 |

**Cotton Chafers**

| | | |
|---|---|---|
| 14.4 oz. (per square yard) | lb. | .73 |
| 9.25 oz. (per square yard) | lb. | .68 |
| 11.65 oz. (per square yard) | lb. | .64 |
| 8.9 oz. (per square yard) | lb. | .70 |

## Liquid Latex

**Natural:** The Rubber Manufacturers Association estimates that 69,453 long tons of hevea latex were imported into the United States in 1956, while some 2,593 long tons were re-exported, leaving a total net new supply of 66,860 long tons. It is reported that during 1956, 74,120 long tons of hevea latex were consumed in the United States. As of December 31, 1956, there were 12,311 long tons of natural rubber latex on hand.

It is the belief of many persons in the trade that the natural latex picture in the months ahead is tied irrevocably to the same set of circumstances that apply to dry natural rubber. Lower prices for hevea latex (current prices are at about a 38-39c level at East coast ports) may stimulate demand to some degree. It will be remembered that at a 40 to 45c level, natural latex had some difficulty finding buyers.

**Synthetic:** From figures now available, it would seem that total consumption of S-type latices in the United States in 1956 was down slightly from the 64,000 long tons consumed in 1955. Consumption of N-type and neoprene latices in 1956 matched the 1955 figures, each accounting for about 9,000 tons each.

The consumption curve for latex seems to be rising each year, and particularly where the synthetic latices are concerned. By all accounts, 1957 should be a banner year for the rubber industry as a whole. It would also seem that the proportionate share held by the synthetic latices in the over-all latex field will continue to rise. There are, at the moment, no indications of any price rises for synthetic latices.

## Cotton

The price of middling uplands on the New York Cotton Exchange has moved in a range of 125 points since our last report (December 31), high for the period being 35.20c reached on January 28, and low being 33.95c reached on January 22. The average price of middling uplands for the month of January was 34.82c based on 22 trading days. This compares with an average of 34.56c recorded in the previous month.

In its final report of the year, the U. S. Department of Agriculture estimated the 1956 cotton crop at 13,303,000 bales of 500 pounds gross weight each. This compares with the 1955 crop of 14,721,000 bales and the ten year 1945-1954 average of $13,698,000 bales per year.

For the first marketing season since 1950-1951, the 1956 crop is expected to be short of demand and the deficit in production will be taken from reserve and surplus stocks of 14,500,000 bales accumulated from previous crops. The bulk of this reserve cotton is held under various government price support programs.

The estimated 1956 crop of 13,303,000 bales is the equivalent of about 13,154,000 running bales. Of this total, the Census Bureau estimates that 12,789,000 bales, or about 97%, was ginned prior to December 13. Thus, the 1956 crop has been one of the most rapidly ginned crops on record. Among the reasons for this is the greater mechanization of cotton picking as well as the smaller crop and acreage involved in 1956.

# MARKET PRICES

## CHEMICALS & COMPOUNDING INGREDIENTS

**FEBRUARY 1, 1957**

Prices are, in general, f.o.b. works and cover the domestic markets only. Export prices, as a rule, are usually slightly higher, due to packing regulations, special handling, etc.

Abbreviations: bbls., barrels; c.l., carload; cyl., cylinder; dlvd., delivered; dms., drums; eqld., equalized; l.c.l., less than carload; M.B. masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

*Trademark. †For Export Only.

The arrangement of this section closely follows the Chemical Section of the 1955-56 RUBBER RED BOOK. Readers are referred to that edition for the correct classification of any material or brand name. Suppliers of every material are contacted for price information. However, only those materials are listed for which quotations have been furnished within the past six months. The quotations are not guaranteed and prospective purchasers should contact suppliers for information. Suppliers are requested to send current price information to the Market Editor, RUBBER AGE.

### ACCELERATORS

| | | | |
|---|---|---|---|
| A-1 (Thiocarbanilide)* | lb. | .72 | .79 |
| A-32* | lb. | .66 | .80 |
| A-100* | lb. | .52 | .66 |
| Accelerator No. 8* | lb. | — | 1.10 |
| Accelerator—49* | lb. | .57 | .58 |
| Accelerator 89* | lb. | — | 1.20 |
| Accelerator 108* | lb. | — | .90 |
| Accelerator—552* | lb. | — | 2.25 |
| Accelerator—808* | lb. | .66 | .68 |
| Accelerator—833* | lb. | 1.17 | 1.19 |
| Accelerator B* | lb. | — | .89 |
| Altax* | lb. | .52 | .54 |
| Ancap*(†) | lb. | .38 | .40 |
| Ancatax*(†) | lb. | .48 | .50 |
| Ancazate BU (ET & ME)*(†) | lb. | — | 1.07 |
| Ancazide ET*(†) | lb. | — | 1.07 |
| ME*(†) | lb. | — | 1.14 |
| Arazate* | lb. | — | 2.25 |
| Arquad 12* | lb. | .55 | .61 |
| Beutene* | lb. | .66 | .68 |
| Bismate, Rodform* | lb. | — | 3.00 |
| Butazate* | lb. | — | 1.04 |
| Butyl Eight* | lb. | 1.10 | 1.35 |
| Captax* | lb. | .42 | .44 |
| C-P-B* | lb. | — | 1.95 |
| Cumate, Rodform* | lb. | — | 1.45 |
| Diorthotolylguanidine | lb. | .62 | .63 |
| Dipac* | lb. | — | .85 |
| Diphenylguanidine | lb. | .52 | .53 |
| El-Sixty* | lb. | .58 | .65 |
| Ethazate* | lb. | — | 1.04 |
| 50D* | lb. | — | .85 |
| Ethyl Thiurad* | lb. | — | 1.04 |
| Ethyl Tuex* | lb. | — | 1.04 |
| Ethylac* | lb. | .93 | .95 |
| Guantal* | lb. | .58 | .65 |
| Harvex* | lb. | .70 | .76 |
| Hepteen Base* | lb. | — | 1.85 |
| Kure-Blend MT* | lb. | — | .70 |
| Ledate, Rodform* | lb. | — | 1.04 |
| MBT-XXX* | lb. | .53 | .55 |
| Merac* | lb. | .75 | 1.05 |
| Mercaptobenzothiazole | lb. | .42 | .44 |
| Mercaptobenzothiazyl Disulfide | lb. | .52 | .54 |
| Mertax* | lb. | .51 | .58 |
| Methazate* | lb. | — | 1.04 |
| Monex* | lb. | — | 1.14 |
| Mono Thiurad* | lb. | — | 1.14 |
| Morfex* | lb. | .65 | .67 |
| 2-MT | lb. | — | 1.00 |
| NA-22* (for neoprene) | lb. | — | 1.00 |
| NOBS No. 1* | lb. | .74 | .76 |
| Special* | lb. | .79 | .81 |
| O-X-A-F | lb. | .53 | .55 |
| Pentex* | lb. | — | 1.04 |
| Flour* | lb. | — | .26 |
| Permalux (Neoprene)* | lb. | — | 2.17 |
| Phenex* | lb. | .52 | .57 |
| Polyac* | lb. | — | 1.85 |
| R-2 Crystals* | lb. | — | 4.35 |
| Rotax* | lb. | .53 | .55 |
| RZ-50-A* | lb. | — | 1.00 |
| B* | lb. | — | 1.00 |
| Santocure* | lb. | .72 | .76 |
| NS* | lb. | .78 | .85 |
| Selenac* (Ethyl, Methyl) | lb. | — | 4.25 |
| Seleram, Ethyl | lb. | — | 4.25 |
| Setsit-5* | lb. | .75 | 1.05 |
| 9* | lb. | .85 | 1.15 |
| SPDX-GH* | lb. | .69 | .71 |
| GL* | lb. | 1.20 | 1.30 |
| Tellurac* | lb. | — | 1.45 |
| Tepidone* | lb. | .45 | .48 |
| Tetrone A* | lb. | — | 1.91 |
| Thiofide* | lb. | .50 | .57 |
| S* | lb. | .52 | .59 |
| Thionex* | lb. | — | 1.14 |
| Thiotax* | lb. | .40 | .47 |
| Thiram, Ethyl | lb. | — | 1.04 |
| Methyl | lb. | — | 1.14 |
| Thiurad* | lb. | — | 1.14 |
| Thiuram E* | lb. | — | 1.04 |
| M* | lb. | — | 1.14 |
| Trimene* | lb. | .56 | .58 |
| Base* | lb. | 1.03 | 1.06 |
| Triphenyl Guanidine | lb. | — | .90 |
| Tuads* (Ethyl) | lb. | — | 1.04 |
| Tuads* (Methyl) | lb. | — | 1.14 |
| Tuex* | lb. | — | 1.14 |
| Ultex* | lb. | 1.00 | 1.10 |
| Unads* | lb. | — | 1.14 |
| ZB* | lb. | — | .85 |
| ZE* | lb. | — | .85 |
| ZM* | lb. | — | .85 |
| Vulcacure NB* | lb. | — | .45 |
| Z-B-X* | lb. | — | 2.45 |
| Zenite* | lb. | .52 | .54 |
| A* | lb. | .62 | .64 |
| Zenite Special* | lb. | .53 | .55 |
| Zetax* (uncoated) | lb. | .53 | .55 |
| Zimate* (Butyl) | lb. | — | 1.04 |
| Zimate* (Ethyl) | lb. | — | 1.04 |
| Zimate* (Methyl) | lb. | — | 1.04 |
| Ziram, Butyl | lb. | — | 1.04 |
| 50% Dispersion | lb. | .87 | .89 |
| Ziram, Ethyl | lb. | — | 1.04 |
| 50% Dispersion | lb. | .87 | .89 |
| Ziram, Methyl | lb. | — | 1.04 |
| 50% Dispersion | lb. | .87 | .89 |

### ACTIVATORS

| | | | |
|---|---|---|---|
| Blue Lead Sublimed (dlvd.) | lb. | .17¼ | .18¼ |
| Cottonseed Fatty Acids | | | |
| Wochem 210* | lb. | — | .15¼ |
| 211* | lb. | — | .15¼ |
| Fish Oil, Hydrogenated, Fatty Acid | | | |
| DAR-S* (dlvd.) | lb. | .12½ | .14½ |
| DAR-HY* (dlvd.) | lb. | .14¼ | .16¼ |
| Hydrofol Acids* (dlvd.) | lb. | .15¼ | .17¼ |
| Hyfac 430* (dlvd.) | lb. | .16¼ | .18¼ |
| Neo-Fat H.F.O.* (dlvd.) | lb. | .14½ | .15¾ |
| Neutrex* (dlvd.) | lb. | .15 | .17 |
| Stearex Beads* (dlvd.) | lb. | .09¾ | .10¾ |
| Stearite* | lb. | .12 | .14 |
| Talene* (dlvd.) | lb. | .15¼ | .17¼ |
| Lime, Hydrated | | | |
| Arrowhead* | ton | — | 21.00 |
| Marblehead* | ton | — | 17.75 |
| Sierra* | ton | — | 22.50 |
| Litharge | | | |
| Eagle-Picher* (c.l.) | lb. | .18 | — |
| SR* (dlvd.) | lb. | — | .18½ |
| Magnesium Oxide, Heavy | | | |
| General Magnesite 500* | lb. | .05½ | .06 |
| 600* | lb. | .06½ | .07 |
| Kaiser 325* | lb. | .057 | .073 |
| Michigan No. 15* | lb. | .05½ | .06½ |
| Magnesium Oxide, Light | | | |
| Carey Mag* | lb. | .25¼ | .26 |
| General Magnesite* (neoprene grade) | lb. | .30 | .32 |
| General Magnesite No 101* | lb. | .25¼ | .26 |
| Genmeg MLW* | lb. | .25¼ | .26 |
| K & M* (neoprene grade) | lb. | .29¼ | .30 |

### ACTIVATORS (Cont'd)

| | | | |
|---|---|---|---|
| Magnesium Oxide, Light (cont'd) | | | |
| Light Calcined Magnesia No. X-01* | lb. | .25¼ | .26 |
| Maglite D* | lb. | .25¼ | .26 |
| L and M* | lb. | .29¼ | .30 |
| Michigan No. 30* | lb. | .25¼ | .26 |
| Neomag Powder* | lb. | .29¼ | .30 |
| Pellets* | lb. | .31¼ | .32 |
| Michigan No. 40* | lb. | .29¼ | .30 |
| Oleic Acid | | | |
| Emersol 210* (dlvd.) | lb. | .17¼ | .18¼ |
| Groco Red Oil* | lb. | .18½ | .20½ |
| Neo-Fat 92-04* | lb. | .20½ | .22½ |
| 94-04* | lb. | .18½ | .20½ |
| Wochem 310, 311 | lb. | — | .18½ |
| Palm Fatty Acids | | | |
| Groco 45* | lb. | .14¼ | .16¼ |
| Neo-Fat* | lb. | .15¼ | .17¼ |
| Wochem 280* | lb. | — | .14¼ |
| 281* | lb. | — | .15¼ |
| Potassium Oleate (dms.) | lb. | .30 | .73 |
| Red Lead | | | |
| Eagle-Picher* (c.l.) | lb. | .19 | — |
| No. 2 RM* (dlvd.) | lb. | — | .18½ |
| Sodium Laurate, 75% | lb. | .64 | .89 |
| Sodium Oleate, 75% | lb. | .54 | .79 |
| Paste (dms.) | lb. | .39 | .64 |
| Sodium Stearate, 75% | lb. | .54 | .89 |
| Stearic Acid, Single Pressed | | | |
| Emersol 110* (dlvd.) | lb. | .14¼ | .16¼ |
| Groco 53* | lb. | .14¼ | .16¼ |
| Neo-Fat 18-53* | lb. | .14¼ | .16¼ |
| Standard Pearlstearic* (dlvd.) | lb. | .14¼ | .16¼ |
| Stearex B* (dlvd.) | lb. | .15½ | .16¼ |
| Wochem 730* | lb. | — | .11¼ |
| Stearic Acid, Double Pressed | | | |
| Choice Pearlstearic* (dlvd.) | lb. | .15¼ | .17¼ |
| Emersol 120* (dlvd.) | lb. | .15¼ | .17¼ |
| Groco 54* | lb. | .15¼ | .17¼ |
| Hydrofol Acid 51RG | lb. | .11¼ | .13¼ |
| Neo-Fat 18-54* | lb. | .15¼ | .17¼ |
| Wochem 731* | lb. | — | .14¼ |
| Stearic Acid, Other | | | |
| Extra Pearlstearic* (dlvd.) | lb. | .17½ | .19½ |
| Groco* | lb. | .12 | .14 |
| Neo-Fat 18* | lb. | .18¼ | .20¼ |
| 18-58* | lb. | .14¼ | .16¼ |
| 18-61* | lb. | .16¼ | .18¼ |
| Stearite* | lb. | .11¼ | .13¼ |
| Wochem 720* | lb. | — | .11¼ |
| 721* | lb. | — | .11¼ |
| 732* | lb. | — | .15¼ |
| White Lead Basic Carbonate | lb. | .19 | .20 |
| White Lead Basic Sulfate | lb. | .17¼ | .18¼ |
| Zinc Laurate | | | |
| Laurex* | lb. | .33 | .34 |
| Zinc Stearate | lb. | .41 | .46 |
| Aquazinc K.C.* | lb. | .30 | .55 |
| Crown Brand* | lb. | .39 | .44 |

### Unclassified Activators

| | | | |
|---|---|---|---|
| Actifat* (dms.) | lb. | — | .18 |
| Aktone* | lb. | .21¼ | .23¼ |
| Barak* | lb. | — | .62 |
| Curade* | lb. | .57 | .59 |
| Dibenzo G-M-F | lb. | — | 2.60 |
| D-B-A* | lb. | — | 1.95 |
| G-M-F* | lb. | — | 2.60 |
| Dibutylamine (dlvd.) | lb. | .55½ | .56½ |
| MODX* | lb. | .32½ | .34½ |
| Neo Fat 42-07* | lb. | .10¼ | .12¼ |
| Ridacto* (dms.) | lb. | .25 | .26 |
| Snodotte* (dlvd.) | lb. | .19 | .21 |
| Vulklor* | lb. | .88 | .98 |

### ANTI-COAGULANTS

| | | | |
|---|---|---|---|
| Aqua Ammonia* (dms.) | lb. | .031 | .035 |
| M.B.M.C.* (l.c.l.) | lb. | .54 | .76 |

### ANTI-FOAMING AGENTS

| | | | |
|---|---|---|---|
| Aero Anti Foam H* | lb | — | .20 |
| Regular* | lb. | — | .12 |
| Anhydrol 6991* | lb. | .51 | .56 |
| D.C Antifoam A* | lb. | 5.45 | 6.65 |
| Antifoam A Emulsion* | lb. | 2.05 | 4.00 |
| Antifoam AF Emulsion* | lb. | 2.05 | 2.85 |
| Defoama W-1701* | lb. | — | .12½ |
| Defoamer A-25* | lb. | — | 3.00 |
| Defoamer 630* | lb. | — | .14 |
| Deltyl Prime | lb. | .70 | .80 |

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**THE STAMFORD RUBBER SUPPLY COMPANY, STAMFORD, CONN.**

## ANTI-FOAMING AGENTS (Cont'd)

| | | | | |
|---|---|---|---|---|
| G-E Antifoam SS-24* | lb. | 5.30 | - | 6.65 |
| SS-66* | lb. | 5.30 | - | 6.65 |
| 60 Emulsion* | lb. | 2.05 | - | 3.75 |
| Igepol CO-210 | lb. | —— | - | .36 |
| Kessco X-3* (dms.) | lb. | —— | - | .35 |
| X-180* | lb. | —— | - | .29¼ |
| X-181* | lb. | —— | - | .38½ |
| Nopco 1407* | lb. | .19½ | - | .20½ |
| 1497-V* | lb. | .13¼ | - | .14¼ |
| 1907-B* | lb. | .18¼ | - | .19¼ |
| JMK* | lb. | .48 | - | .49 |
| JMU* | lb. | .22½ | - | .23½ |
| JMY* | lb. | .19¼ | - | .20¼ |
| Pluronic L61* | lb. | .33½ | - | .39 |
| RS-968* | lb. | .38 | - | .38½ |
| Terpinol Prime No. 1 | lb. | .35 | - | .50 |
| Tributyl Phosphate (dms.) | lb. | .52½ | - | .53¼ |

## ANTIOXIDANTS

| | | | | |
|---|---|---|---|---|
| Agebest 1293-22A* | lb. | 1.90 | - | 2.00 |
| AgeRite Alba* | lb. | 2.35 | - | 2.45 |
| Gel* | lb. | .67 | - | .69 |
| Hipar* | lb. | 1.00 | - | 1.02 |
| H.P.* | lb. | .76 | - | .78 |
| Powder* | lb. | .55 | - | .57 |
| Resin* | lb. | .82 | - | .84 |
| Resin D* | lb. | .55 | - | .57 |
| Spar* | lb. | .55 | - | .57 |
| Stalite* | lb. | .55 | - | .57 |
| Stalite S* | lb. | .55 | - | .57 |
| Superlite* | lb. | .55 | - | .57 |
| White* | lb. | 1.45 | - | 1.55 |
| Akroflex C* | lb. | .81 | - | .83 |
| CD* | lb. | .76 | - | .78 |
| Aminox* | lb. | .55 | - | .57 |
| Antioxidant 425* | lb. | 2.47 | - | 2.50 |
| Antioxidant 2246* | lb. | 1.50 | - | 1.53 |
| Antox* | lb. | .55 | - | .57 |
| Aranox* | lb. | —— | - | 3.25 |
| Benzoquinone | lb. | 1.50 | - | 1.75 |
| Betanox Special* | lb. | .85 | - | .87 |
| B-L-E* | lb. | .55 | - | .57 |
| B-X-A* | lb. | .55 | - | .57 |
| Deenax* | lb. | .95 | - | 1.05 |
| Di-tert-Butyl-para-Cresol | lb. | .86 | - | 1.16 |
| Eugenol C-95%* | lb. | 2.30 | - | 2.50 |
| Flectol H* | lb. | .55 | - | .62 |
| Flexamine* | lb. | .76 | - | .78 |
| Ionol* (dms.) | lb. | .91 | - | .95 |
| Neozone A* | lb. | .59 | - | .61 |
| C* | lb. | —— | - | .83 |
| D* | lb. | .55 | - | .57 |
| Nevastain A* | lb. | .51 | - | .61 |
| B* | lb. | .51 | - | .70 |
| Nullapon BF-12* | lb. | —— | - | .21½ |
| BF-13* | lb. | —— | - | .25½ |
| BF-78* | lb. | —— | - | .55 |
| BF-Acid* | lb. | —— | - | .85 |
| Octamine* | lb. | .55 | - | .57 |
| Oxidex* | lb. | —— | - | 3.60 |
| PDA-10* | lb. | .46 | - | .48 |
| Permalux* | lb. | —— | - | 2.17 |
| Polygard* | lb. | .55 | - | .57 |
| Santoflex AW* | lb. | .78 | - | .85 |
| DD* | lb. | .55 | - | .62 |
| 75* | lb. | .97 | - | 1.04 |
| Santovar-A* | lb. | 1.50 | - | 1.57 |
| Santowhite Crystals* | lb. | 1.55 | - | 1.62 |
| Santowhite L* | lb. | .55 | - | .62 |
| MK* | lb. | 1.25 | - | 1.32 |
| Powder* | lb. | 1.55 | - | 1.62 |
| Sequestrene AA* | lb. | .76 | - | .85 |
| NA2* | lb. | .62 | - | .70 |
| NA3* | lb. | .61 | - | .69 |
| Stabilite* | lb. | .55 | - | .57 |
| Alba* | lb. | .72 | - | .77 |
| FLX* | lb. | —— | - | .65 |
| L* | lb. | .60 | - | .62 |
| White* | lb. | .52 | - | .54 |
| White Powder* | lb. | .41 | - | .43 |
| Stabilizer No. 1* | lb. | 1.55 | - | 1.80 |
| Stabilizer No. 9-A* | lb. | .80 | - | 1.05 |
| Stypben I* | lb. | .51 | - | .55 |
| Sunolite* | lb. | .16 | - | .22 |
| Tannic Acid, Tech. | lb. | .46 | - | .48 |
| Thermoflex A* | lb. | 1.00 | - | 1.02 |
| V-G-B* | lb. | .75 | - | .77 |
| Wing-Stay S* | lb. | .53 | - | .57 |

## ANTI-SCORCHING AGENTS

| | | | | |
|---|---|---|---|---|
| Armeen HT* | lb. | .34 | - | .40 |
| Good-rite Vultrol* | lb. | .62 | - | .64 |
| Harcopol 1183* | lb. | .70 | - | .74 |
| Retarder PD* | lb. | .37 | - | .39 |
| W* | lb. | —— | - | .42 |
| Sodium Acetate 60-62% Crystals | lb. | .08 | - | .08½ |

## ANTISEPTICS AND GERMICIDES

| | | | | |
|---|---|---|---|---|
| A.P.C. 6901* | lb. | .32 | - | .38 |
| Arquad S* | lb. | .38 | - | .44 |
| Formaldehyde (dms.) | lb. | .06 | - | .076 |
| G-4* (bbls.) | lb. | 1.09 | - | 1.29 |
| G-11* | lb. | 1.98 | - | 2.08 |
| Halane* | lb. | .40 | - | .47 |
| Ortho Cresol (26°—27°) | lb. | .14 | - | .16¼ |
| Preventol GD | lb. | —— | - | 1.09 |
| Retarder D* | lb. | .42 | - | .50 |
| Vancide | lb. | —— | - | .80 |

## ANTI-WEBBING AGENTS (for Latex)

| | | | | |
|---|---|---|---|---|
| DC 7 Compound* | lb. | 5.13 | - | 6.50 |
| Webnix 34-L* | lb. | 1.25 | - | 1.75 |
| 69-C* | lb. | 1.50 | - | 2.25 |

## AROMATICS (DEODORANTS)

| | | | | |
|---|---|---|---|---|
| Airkem 115* | gal. | —— | - | 6.50 |
| 122* | gal. | —— | - | 6.50 |
| 186* | gal. | —— | - | 6.50 |
| Alamask AA* | lb. | —— | - | 3.00 |
| AF* | lb. | —— | - | 2.50 |
| AO* | lb. | —— | - | 1.50 |
| AR* | lb. | —— | - | .50 |
| BG* | lb. | —— | - | 1.15 |
| BGM* | lb. | —— | - | .60 |
| CY* | lb. | —— | - | 2.40 |
| DJ* | lb. | —— | - | 3.35 |
| DL* | lb. | —— | - | 1.95 |
| H* | lb. | —— | - | 5.50 |
| LD* | lb. | —— | - | .75 |
| ND* | lb. | —— | - | 2.75 |
| O* | lb. | —— | - | 6.50 |
| OS* | lb. | —— | - | 5.25 |
| Bouquet 149* | lb. | —— | - | 3.00 |
| Coumarin* | lb. | 3.60 | - | 3.70 |
| Curodex 19* | lb. | 4.75 | - | 4.90 |
| 188* | lb. | 5.75 | - | 5.90 |
| 198* | lb. | 6.75 | - | 6.90 |
| Deodorant 65* | lb. | —— | - | 1.85 |
| Deodorant L-37* | lb. | 2.15 | - | 2.25 |
| L-44* | lb. | 2.65 | - | 2.75 |
| N.L.T.X.* | lb. | 1.90 | - | 2.00 |
| Deodorant Oil GD 6422* | lb. | 1.90 | - | 2.20 |
| GD 6423* | lb. | 1.60 | - | 1.90 |
| GD 6575* | lb. | 2.40 | - | 2.90 |
| GD 31063* | lb. | 2.25 | - | 2.75 |
| Ethavan* | lb. | 6.20 | - | 6.25 |
| Latex Perfume 17326 | lb. | —— | - | 4.00 |
| 18301 | lb. | —— | - | 3.00 |
| 22258 | lb. | —— | - | 2.50 |
| Naugaromes* (dms.) | lb. | .60 | - | 3.00 |
| Neutroleum Delta* | lb. | —— | - | 2.60 |
| Gamma* | lb. | —— | - | 3.60 |
| Parador A* | lb. | 1.80 | - | 2.10 |
| C* | lb. | 2.00 | - | 2.50 |
| E* | lb. | .25 | - | .40 |
| GD 5280* | lb. | 2.00 | - | 2.50 |
| GD 53481* | lb. | 1.70 | - | 2.00 |
| Perfume Oil Bouquet Vanilla M* | lb. | 1.60 | - | 1.70 |
| Rodo No. 0* | lb. | 4.00 | - | 4.50 |
| No. 10* | lb. | 5.00 | - | 5.50 |
| Rubbarome* (dms.) | lb. | .60 | - | 3.80 |
| Rubber Perfume 12* | lb. | —— | - | 4.35 |
| Russian Leather 7* | lb. | —— | - | 4.35 |
| Vanillin | lb. | 2.75 | - | 2.80 |

## BLOWING AGENTS

| | | | | |
|---|---|---|---|---|
| Ammonium Bicarbonate | cwt. | —— | - | 8.00 |
| Better Blend Soda* (c.l., bags) | cwt. | —— | - | 2.55 |
| Blowing Agent CP-975* | lb. | .32 | - | .35 |
| Celogen* | lb. | —— | - | 1.95 |
| AZ* | lb. | —— | - | 1.95 |
| Diazo Amino Benzene | lb. | —— | - | .73 |
| Neo Fat 42-12* | lb. | .10¼ | - | .12¼ |
| Sodium Bicarbonate, U.S.P. (c.l., bags) | cwt. | —— | - | 2.40 |
| Sponge Paste* | lb. | —— | - | .20 |
| Unicel ND* | lb. | —— | - | .76 |
| S* | lb. | —— | - | .20 |
| Urea | lb. | .06 | - | .07 |

## BONDING AGENTS

| | | | | |
|---|---|---|---|---|
| Base 6986* | lb. | .27 | - | .32 |
| Braze* | gal. | 6.00 | - | 9.00 |
| Cover Cement* | gal. | 2.50 | - | 4.00 |
| Durez 12987* | lb. | —— | - | .54 |
| Gen-Tac Latex* | lb. | .70 | - | .75 |
| Hylene M* | lb. | 3.50 | - | 3.75 |
| M-50* | lb. | 1.90 | - | 2.15 |
| Penacolite B1A* | lb. | —— | - | .95 |
| R-2710* | lb. | —— | - | .95 |
| Pliobond 20* | gal. | 2.91 | - | 4.23 |
| 30* | gal. | 3.65 | - | 4.97 |
| Rex Compounds* | gal. | 1.30 | - | 1.90 |
| Thixons* | gal. | 3.30 | - | 9.00 |
| Ty-Ply Q (BN & S)* | gal. | 6.75 | - | 8.00 |
| Tygobond 30* | gal. | 5.50 | - | 7.45 |
| Vinculux | gal. | —— | - | 4.95 |

## COAGULANTS

| | | | | |
|---|---|---|---|---|
| Acetic Acid—56% (bbls. | cwt. | 5.0[illegible] | - | 11.00 |
| Glacial 99½% (dms. | lb. | .12 | - | .13 |
| Calcium Nitrate, Tech. Flake | lb. | .12½ | - | .15 |
| Hydroxyacetic Acid—70% (dms.) | lb. | —— | - | .09[illegible] |
| Zinc Nitrate, Tech. Flake | lb. | —— | - | .20 |

## COLORING AGENTS

### Black

| | | | | |
|---|---|---|---|---|
| Aquablak B* | lb. | .09¼ | - | .10¼ |
| M* | lb. | .10½ | - | .11 |
| R* | lb. | .10¾ | - | .11¼ |
| S* | lb. | .11¼ | - | .12¼ |
| Black Shield 4-35* (dms) | lb. | .09 | - | .09½ |
| No. 5 | lb. | .10 | - | .10½ |
| No. 6 | lb. | .09 | - | .09½ |
| L-1404B | lb. | .10½ | - | .11 |
| Carbon Black—See *Reinforcing Agents* | | | | |
| Cooke 1026* | lb. | —— | - | 2.50 |
| Lampblack No. 10* | lb. | .06 | - | .09 |
| Mapico Black Iron Oxide* (50 lb. bags) | lb. | .14½ | - | .14½ |
| Pure Black Iron Oxide | lb. | .14¼ | - | .14½ |

## COLORING AGENTS (Cont'd)

### Blue

| | | | | |
|---|---|---|---|---|
| Akron Masterbatches* | lb. | 2.23 | - | 2.78 |
| Toners* | lb. | 2.30 | - | 6.35 |
| Blue Powders | lb. | 2.20 | - | 3.75 |
| Cooke M.B. Blue* | lb. | 2.20 | - | 3.75 |
| Monastral Rubber Blue CPL* | lb. | —— | - | 1.95 |
| PCD, Dispersed* | lb. | —— | - | 2.20 |
| Peacoline Blue* | lb. | —— | - | 3.85 |
| Ramapo Blue* | lb. | 2.75 | - | 3.00 |
| Rubber Blue GD* (Disp.) | lb. | —— | - | 4.75 |
| Rubber Blue X-1999* | lb. | —— | - | 1.90 |
| Rubber Dispersed Blues | lb. | 2.52 | - | 2.78 |
| Solfast Sky Blue* | lb. | 3.00 | - | 3.60 |
| Syntheline Blue* | lb. | —— | - | 3.85 |
| Stan-Tone MBS* | lb. | 1.55 | - | 4.55 |
| GPE* | lb. | —— | - | 2.50 |
| PC* | lb. | 1.40 | - | 1.80 |
| Ultramarine | lb. | .14 | - | .30 |
| Vansul Blue M.B.* | lb. | .95 | - | 2.60 |

### Brown

| | | | | |
|---|---|---|---|---|
| Brown Iron Oxide | lb. | .15¼ | - | .15½ |
| Mapico Brown* (50 lb. bags) | lb. | .15¼ | - | .15½ |
| Stan-Tone GPE* | lb. | —— | - | 3.00 |
| Vansul Brown M.B.* (Organic) | lb. | —— | - | 2.15 |

### Green

| | | | | |
|---|---|---|---|---|
| Akron Masterbatches* | lb. | 1.38 | - | 3.08 |
| Toners* | lb. | 1.35 | - | 4.95 |
| Cooke M.B. Green* | lb. | 1.60 | - | 2.80 |
| 1013* | lb. | —— | - | 2.80 |
| Filo Green* | lb. | —— | - | .34 |
| Green Powders | lb. | 1.35 | - | 3.95 |
| Monastral Rubber Green GSD* (Dispersed) | lb. | —— | - | 2.66 |
| GSL* | lb. | —— | - | 2.20 |
| Permansa Green CP-594* | lb. | —— | - | 1.35 |
| Pigment Green B* | lb. | —— | - | 1.35 |
| GL-652D* | lb. | .90 | - | 1.00 |
| Ramapo Green* | lb. | —— | - | 3.50 |
| Rubber Dispersed Greens | lb. | 1.23 | - | 3.08 |
| Rubber Green FD* (Disp.) | lb. | —— | - | 2.05 |
| Rubber Green X-1292* | lb. | —— | - | 1.65 |
| Solfast Green* | lb. | —— | - | 3.95 |
| Stan-Tone MBS* | lb. | 1.55 | - | 3.35 |
| GPE* | lb. | 3.00 | - | 4.50 |
| PC* | lb. | 1.70 | - | 3.80 |
| Vansul Green M.B.* | lb. | 1.05 | - | 2.90 |

### Maroon

| | | | | |
|---|---|---|---|---|
| Akron Masterbatches* | lb. | —— | - | 4.10 |
| Toners* | lb. | 2.00 | - | 4.00 |
| Maroon Powders | lb. | .79 | - | 3.60 |
| Pyrolux Maroon* | lb. | —— | - | 3.65 |
| Vansul Maroon M.B.* | lb. | —— | - | 3.35 |

### Orange

| | | | | |
|---|---|---|---|---|
| Akron Masterbatches* | lb. | 2.42 | - | 2.77 |
| Toners* | lb. | 2.82 | - | 4.00 |
| Benzidene Orange | lb. | —— | - | 3.00 |
| Cooke MB* | lb. | 2.25 | - | 2.35 |
| 1021* | lb. | —— | - | 2.25 |
| Mercadium X-2667* | lb. | —— | - | 1.78 |
| Molybdate Orange | lb. | .46½ | - | .48 |
| Oswego Orange X2065* | lb. | —— | - | 3.15 |
| Rubber Orange OD* (Disp.) | lb. | —— | - | 2.25 |
| Solfast Orange* | lb. | —— | - | 2.25 |
| Stan-Tone Cadmium Dry* | lb. | 2.02 | - | 4.45 |
| Cadmium Paste* | lb. | 2.47 | - | 3.20 |
| GPE* | lb. | 1.20 | - | 4.35 |
| PC* | lb. | .75 | - | 2.75 |
| Vansul Orange M.B.* | lb. | 2.40 | - | 2.45 |

### Red

| | | | | |
|---|---|---|---|---|
| Akron Masterbatches* | lb. | 1.00 | - | 3.53 |
| Toners* | lb. | .88 | - | 5.60 |
| Arcturus Reds* | lb. | —— | - | 1.13 |
| Antimony Trisulfide | lb. | .72 | - | .78 |
| R.M.P. Sulfur Free* | lb. | —— | - | .78 |
| R.M.P. No. 3* | lb. | —— | - | .72 |
| Brilliant Toning Reds* | lb. | 1.65 | - | 1.95 |
| Cadmolith Red* (dms.) | lb. | 2.11 | - | 3.40 |
| Cooke M.B. Red* | lb. | 1.05 | - | 3.25 |
| 1010* | lb. | —— | - | 1.75 |
| Graphic Red (dlvd.) | lb. | .88 | - | .93 |
| Kroma Reds* | lb. | .14 | - | .15 |
| Lake Red C* | lb. | —— | - | 1.13 |
| Mapico Reds* (50 lb. bags) | lb. | .13¾ | - | .14 |
| Mercadium X-2668 Light* | lb. | —— | - | 1.95 |
| X-2669 Medium Light* | lb. | —— | - | 2.10 |
| X-2670 Medium* | lb. | —— | - | 2.25 |
| X-2671 Dark* | lb. | —— | - | 2.41 |
| Oximony Red Iron Oxide | lb. | .12¼ | - | .13 |
| Plasticone Reds* | lb. | —— | - | 4.60 |
| Polaris Red* | lb. | —— | - | 1.65 |
| Recco Red Oxide* | lb. | .12 | - | .13 |
| Red Iron Oxide, Light | lb. | .13¼ | - | .14 |
| Red Powders | lb. | —— | - | 4.40 |
| Rubber Dispersed Reds | lb. | 1.47 | - | 3.58 |
| Rubber Red PBD* (Disp.) | lb. | —— | - | 1.90 |
| 2BD, Dispersed* | lb. | —— | - | 1.80 |
| 2BL* | lb. | —— | - | 1.24 |
| PBL* | lb. | —— | - | 1.24 |
| Rubanox Reds* | lb. | 1.40 | - | 1.50 |
| Rubber Red CP-339* (dlvd.) | lb. | —— | - | 1.10 |
| Rubber Red X-1148* | lb. | —— | - | .93 |
| Solfast Red* | lb. | 1.40 | - | 1.50 |
| Stan-Tone MBS* | lb. | 1.20 | - | 3.53 |
| GPE* | lb. | 1.65 | - | 2.00 |
| PC* | lb. | 1.30 | - | 2.50 |
| PDS* | lb. | 1.40 | - | 1.55 |
| PVC* | lb. | 1.65 | - | 1.90 |
| Vansul Red M.B.* | lb. | 1.00 | - | 3.35 |
| Watchung Red* | lb. | 1.65 | - | 1.95 |

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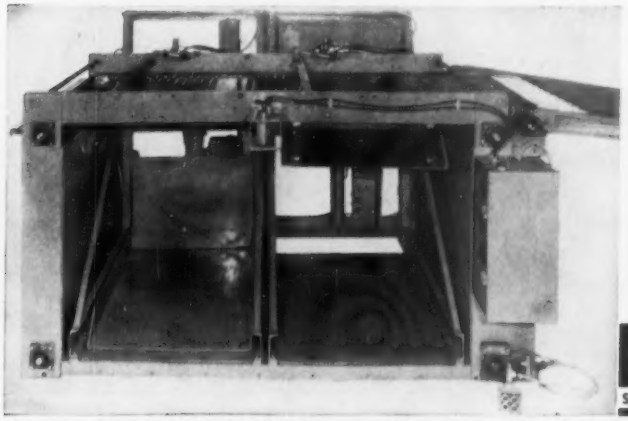

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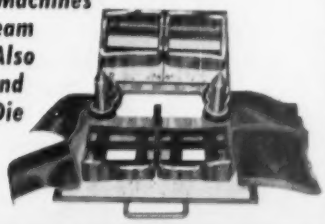

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## COLORING AGENTS (Cont'd)

### Tan

| | | | |
|---|---|---|---|
| Mapico Tan 15* (50 lb. bags) | lb. | .22¾ - | .2300 |
| 20* (50 lb. bags) | lb. | .22¾ - | .2300 |

### White—Lithopone

| | | | |
|---|---|---|---|
| Eagle-Picher* | lb. | .0800 - | .0975 |
| Permolith* | lb. | .0800 - | .0875 |
| Sunolith* | lb. | .0800 - | .0875 |

### White—Titanium Pigments

| | | | |
|---|---|---|---|
| Horse Head Anatase Grades* | lb. | .24½ - | .25½ |
| Rutile Grades* | lb. | .25½ - | .26½ |
| Stan-Tone PC* | lb. | — - | .55 |
| Ti-Cal* | lb. | .09 - | .09¾ |
| R-25*, R-22*, R-27*, R-30* | lb. | .09 - | .09½ |
| R-60* | lb. | .09¾ - | .09¾ |
| Ti-Pure* | lb. | .24½ - | .27½ |
| Anatase Grades* | lb. | .24½ - | .25½ |
| Rutile Grades* | lb. | .26½ - | .27½ |
| Titanox A*—all grades (dlvd.) | lb. | .24½ - | .25½ |
| C-50* (dlvd.) | lb. | .13⅜ - | .14¾ |
| RA* (dlvd.) | lb. | .26½ - | .27½ |
| RA-10* (dlvd.) | lb. | .26½ - | .27½ |
| RA-NC* (dlvd.) | lb. | .26½ - | .27½ |
| RC* (dlvd.) | lb. | .09¾ - | .09¾ |
| RC-HT* (dlvd.) | lb. | .09 - | .09¾ |
| Unitane O-110* | lb. | — - | .245 |
| Unitane O-110* | lb. | .24½ - | .25½ |
| O-220* | lb. | .24½ - | .25½ |
| O-310* | lb. | .24½ - | .25½ |
| O-410* | lb. | .24½ - | .25½ |
| OR-150* | lb. | .26½ - | .27½ |
| OR-250* | lb. | .26½ - | .27½ |
| OR-340* | lb. | .26½ - | .27½ |
| OR-342* | lb. | .26½ - | .27½ |
| OR-350* | lb. | .26½ - | .27½ |
| OR-540* | lb. | .26½ - | .27½ |
| OR-640* | lb. | .26½ - | .27½ |
| Zopaque* | lb. | .24½ - | .25¼ |
| R* | lb. | .26½ - | .27½ |

### White—Zinc Oxide (American Process)

| | | | |
|---|---|---|---|
| AZO-DOX 44, 45 | lb. | .1450 - | .1550 |
| AZO-ZZZ 11* (22*, 33*, 44*, 55*) | lb. | .1450 - | .1550 |
| Eagle-Picher AAA* | lb. | .1450 - | .1550 |
| Horse Head Special* | lb. | .1450 - | .1550 |
| XX* | lb. | .1450 - | .1550 |
| Protox 166* | lb. | .1450 - | .1550 |
| 167* | lb. | .1450 - | .1550 |
| 267* (pelleted) | lb. | .1450 - | .1550 |
| St. Joe Black Label* | lb. | .1450 - | .1550 |
| Green Label* | lb. | .1450 - | .1550 |
| Red Label* | lb. | .1450 - | .1550 |
| Pelleted | lb. | .1450 - | .1550 |

### White—Zinc Oxide (Dispersed)

| | | | |
|---|---|---|---|
| Dispersed Zinc Oxide | lb. | — - | .13 |

### White—Zinc Oxide (French Process)

| | | | |
|---|---|---|---|
| AZO-ZZZ 66 | lb. | .1450 - | .1550 |
| Florence Green Seal* | lb. | .1625 - | .1725 |
| Red Seal* | lb. | .1575 - | .1675 |
| White Seal* | lb. | .1675 - | .1775 |
| Kadox 25* | lb. | .1675 - | .1775 |
| 15*, 17*, 72* & 515* | lb. | .1450 - | .1550 |
| Protox 168* | lb. | .1450 - | .1550 |
| 169* | lb. | .1450 - | .1550 |
| 268* (pelleted) | lb. | .1450 - | .1550 |
| U.S.P. (cartons) | lb. | .1775 - | .1875 |
| XX-78* | lb. | .1450 - | .1550 |

### White—Zinc Sulfide

| | | | |
|---|---|---|---|
| Cryptone ZS* | lb. | .2530 - | .2630 |
| Lehigh 35%* | lb. | .1550 - | .1650 |
| 50%* | lb. | .1585 - | .1685 |

### Yellow

| | | | |
|---|---|---|---|
| Akron Masterbatch* | lb. | 1.12 - | 2.18 |
| Toners* | lb. | 2.10 - | 6.00 |
| Benzidene-Lightfast | lb. | 2.75 - | 3.50 |
| Benzidine Yellow | lb. | 2.35 - | 2.45 |
| Cadmolith Yellow† (dms.) | lb. | 1.12 - | 1.20 |
| Chrome Yellow | lb. | .32½ - | .35 |
| Cooke M.B. Yellow 405* | lb. | 2.15 - | 2.75 |
| 105* | lb. | — - | 2.15 |
| Iron Oxide, Pure Light Shades | lb. | .12 - | .12¼ |
| Dark Shades | lb. | .11½ - | .11¾ |
| Mapico Yellow* (50 lb. bags) | lb. | .12 - | .13¼ |
| Rubber Dispersed Yellows | lb. | 1.27 - | 2.13 |
| Rubber Yellow GD* (disp.) | lb. | — - | 2.25 |
| GL* | lb. | — - | 1.68 |
| Rubber Yellow X-1940* | lb. | — - | 2.35 |
| Stan-Tone Cadmium Dry* | lb. | 2.80 - | 3.03 |
| Cadmium Paste* | lb. | 1.63 - | 1.99 |
| MBS* | lb. | 1.30 - | 2.20 |
| GPE* | lb. | 4.25 - | 4.50 |
| PC* | lb. | .55 - | 3.40 |
| Sumatra Yellow X-1940* | lb. | — - | 2.45 |
| Toluidine Yellow | lb. | 2.00 - | 2.10 |
| YL-660 D* | lb. | 1.25 - | 1.35 |
| Oximony Iron Oxide | lb. | .12¾ - | .13 |
| Vansul Yellow M.B.* | lb. | 1.00 - | 2.00 |
| Yellow Powders | lb. | 2.00 - | 5.00 |
| Zinc Yellow | lb. | .27½ - | .29 |

## DISPERSING AGENTS

| | | | |
|---|---|---|---|
| Anchoid*(†) | lb. | .24 - | .25 |
| Anhydrapent* | lb. | .56 - | .59 |
| Armeen 18* | lb. | .39 - | .45 |
| Blancol* | lb. | — - | .15¼ |
| Darvan No. 1* (and No. 2*) | lb. | .22 - | .30 |
| Daxad 11* (21*, 23*) | lb. | .08 - | .30 |
| Diethanolamine (dms., dlvd.) | lb. | .24½ - | .27½ |
| Dispersaid* | lb. | 1.25 - | 1.35 |
| Emcol K-8300* (dms.) | lb. | .14 - | .18 |
| P10-59 | lb. | .32 - | — |
| 5120 | lb. | .31 - | — |
| 5138 | lb. | .31 - | — |
| Emulphor ON-870* | lb. | — - | .55 |
| Furala* | lb. | .06½ - | .07½ |
| Halloid* | lb. | .04½ - | .05½ |
| Hycryl A-1000* | lb. | .09 - | .09½ |
| Igepal CO-630* | lb. | — - | .29 |
| Igepon T-73* | lb. | — - | .29½ |
| Kyro EO* (dms.) | lb. | — - | .29¾ |
| Leomil SA* | lb. | — - | .55 |
| Lomar PW* | lb. | — - | .18 |
| Marasperse C* | lb. | .06¼ - | .06¼ |
| CB* | lb. | .13 - | .15 |
| N* | lb. | .09½ - | .10½ |
| Monoethanolamine (dms., dlvd.) | lb. | .25 - | .28 |
| Naccotan A* | lb. | .16½ - | .17 |
| Nekal BA-75* | lb. | — - | .40 |
| BX-78* | lb. | — - | .64 |
| Nopco 1187-X* | lb. | .15 - | .16 |
| Pluronic F68* | lb. | .38½ - | .44 |
| Polyfon* | lb. | .08 - | .09 |
| R & R 551* | lb. | — - | .28 |
| Rubbex* | lb. | .247 - | .277 |
| Stablex B* | lb. | .50 - | .95 |
| Stan-Chem BQC* | lb. | .12¼ - | .17¼ |
| 1067* | lb. | — - | .13½ |
| 1471* | lb. | .1687 - | .2187 |
| 2251* | lb. | .12¼ - | .17¼ |
| Trenamine D-25* | lb. | .32½ - | .36 |
| Triethanolamine (dms., dlvd.) | lb. | .22 - | .25 |
| Yelkin TT* (and TTS*) | lb. | .13 - | .16 |

## EXTENDERS

| | | | |
|---|---|---|---|
| Arco 1071-13B* | lb. | .14½ - | .15½ |
| 1073-18B* | lb. | .13½ - | .14½ |
| 1294-36B* | lb. | .11½ - | .12½ |
| Car-Bel-Ex-A* (and B*) | lb. | — - | .14 |
| Extender 600* | lb. | — - | .1765 |
| Facile Gum 4A* | lb. | .48 - | .50 |
| Millex* | lb. | — - | .07 |
| W* | lb. | — - | .07 |
| Nopco 2271* | lb. | .15½ - | .16½ |
| Polyco 418* | lb. | .17 - | .18 |
| PR-162 Latex Extender* | lb. | — - | .182 |
| Solvitose HDF* | lb. | .22 - | .25 |
| Synprolac* | lb. | .16 - | .23 |
| Synprowax* | lb. | — - | .23 |
| Vistanex MM Grades* | lb. | — - | .35 |

## FILLERS (Inert and Reinforcing)

| | | | |
|---|---|---|---|
| Abrasives | | | |
| Carbonite* | lb. | .21½ - | 1.35 |
| Lionite* | lb. | .16 - | 1.27 |
| Pumice | lb. | .03 - | .05 |
| Walnut Shell Grits | lb. | .05 - | .08 |
| Aluminum Hydrate | lb. | .0850 - | .1200 |
| Kaiser Alumina* | lb. | .026 - | .059 |
| Aluminum Silicate | | | |
| AFD* | ton | 26.50 - | 60.00 |
| Aluminum Flake* | ton | 23.50 - | 32.50 |
| Marter White* | ton | 18.50 - | 30.00 |
| Barium Carbonate (l.c.l.) | ton | 95.50 - | 100.00 |
| Barytes | | | |
| No. 1 Floated, White* | ton | 45.00 - | 65.10 |
| No. 2 Floated, Unbleached* | ton | 43.00 - | 63.10 |
| No. 22 Barytes* (c.l.) | ton | — - | 30.00 |
| No. 3805 Barytes* | ton | 22.00 - | 26.75 |
| Foam A* | ton | — - | 45.00 |
| Sparmite* | ton | 80.00 - | 85.00 |
| XIOR* | ton | 80.00 - | 85.00 |
| Bentonite (c.l.) | ton | — - | 13.50 |
| Argosite Clay* (c.l.) | ton | — - | 12.50 |
| Bennett Clay* (c.l.) | ton | — - | 32.50 |
| SPV Volclay* (c.l.) | ton | — - | 12.50 |
| White Hi-Gel* | ton | — - | 65.90 |
| Blanc Fixe | ton | 72.50 - | 120.00 |
| Calcium Carbonate | | | |
| Atomite* (c.l.) | ton | — - | 32.50 |
| B.T. White No. 1 (c.l.) | ton | — - | 9.00 |
| Caleene NC* | ton | 72.50 - | 92.50 |
| TM* | ton | 75.00 - | 95.00 |
| Calwhite* | ton | — - | 20.00 |
| Camel-Carb* | ton | — - | 12.00 |
| Camel-Tex* | ton | — - | 20.00 |
| Camel-Wite* | ton | — - | 32.50 |
| Durumite* | ton | — - | 20.00 |
| Gamaco* (c.l.) | ton | — - | 32.50 |
| Georgia Marble 5-25* (c.l.) | ton | — - | 20.00 |
| No. 10 White* (c.l.) | ton | — - | 11.00 |
| Kalite* | ton | 50.00 - | 65.00 |
| Laminar* | ton | — - | 30.00 |
| Lesmite* (c.l.) | ton | — - | 27.50 |
| Lorite* | ton | 30.00 - | 36.00 |
| Millical* | ton | 38.00 - | 53.00 |
| Multifex MM* | ton | 110.00 - | 125.00 |
| Non-Fer-Al* | ton | 32.50 - | 37.50 |
| Purecal M* | ton | 56.75 - | 80.75 |
| SC* (and T*) | ton | 110.00 - | 125.00 |
| U* | ton | 120.00 - | 135.00 |

## FILLERS (Cont'd)

| | | | |
|---|---|---|---|
| Calcium Carbonate (cont'd) | | | |
| Rambo No. 1* | ton | — - | 10.50 |
| Snowflake* | ton | 17.00 - | 20.00 |
| Super Multifex* | ton | 160.00 - | 175.00 |
| Surfex* | ton | 37.50 - | 52.50 |
| Suspenso* | ton | 35.50 - | 50.50 |
| Witcarb Reg.* | ton | 56.75 - | 85.00 |
| P* | ton | 110.00 - | 140.00 |
| R* | ton | 120.00 - | 150.00 |
| RC* | ton | 110.00 - | 140.00 |
| York White* | ton | — - | 10.50 |
| Calcium Silicate | | | |
| Silene EF* | ton | 120.00 - | 140.00 |
| Calcium Sulfate, Anhydrous | | | |
| Snow White Filler* | ton | — - | 21.00 |
| Calcium Sulfate Hydrous | | | |
| Terra Alba No. 1* | ton | — - | 17.00 |
| Chalk Whiting (l.c.l.) | lb. | .01½ - | .01¾ |
| Recco Paris Whiting* | ton | — - | 35.00 |
| OMYA Whiting* | ton | — - | 30.00 |
| Clay | | | |
| Afton Clay* | ton | 12.00 - | 35.50 |
| Aiken Clay* | ton | — - | 13.00 |
| Alsilite* (c.l.) | ton | 30.00 - | 45.00 |
| Aluminum Flake* | ton | 23.50 - | 30.00 |
| Buca* (c.l.) | ton | — - | 45.00 |
| Burgess No. 20* | ton | — - | 35.00 |
| No. 30* | ton | — - | 37.00 |
| Burgess Iceberg* | ton | — - | 50.00 |
| Catalpo* (c.l.) | ton | — - | 35.00 |
| Champion* | ton | — - | 14.00 |
| Crown* | ton | — - | 14.00 |
| Dixie* (c.l.) | ton | — - | 14.00 |
| Franklin Clay—R* (c.l.) | ton | 15.00 - | 39.00 |
| G. K. Soft* | ton | 11.00 - | 28.00 |
| Harwick Clays* | ton | 14.50 - | 57.00 |
| Hi-White R* | ton | — - | 13.50 |
| Kaolloid Clay* (c.l.) | ton | — - | 10.50 |
| LGB* | ton | — - | 17.00 |
| LGP* | ton | — - | 19.00 |
| McNamee* (c.l.) | ton | — - | 13.50 |
| Natka 1200 (c.l.) | ton | — - | 12.00 |
| Par* (c.l.) | ton | — - | 12.00 |
| Paragon* | ton | — - | 13.50 |
| Pigment 5* | ton | 23.50 - | 26.50 |
| 33* | ton | — - | 37.00 |
| Recco* (c.l.) | ton | — - | 14.00 |
| Swanee Clay* | ton | — - | 12.50 |
| Snobrite* | ton | — - | 12.50 |
| Suprex* | ton | — - | 14.00 |
| Whitetex* (c.l.) | ton | — - | 50.00 |
| 4200 Clay* | ton | — - | 11.00 |
| Diatomaceous Earth | ton | 30.00 - | 50.00 |
| Kaylorite* (c.l.) | ton | — - | 30.00 |
| Lorite* | ton | — - | 30.00 |
| Flock | | | |
| Cotton (White) | lb. | .28 - | .32 |
| Colored | lb. | .11 - | .13½ |
| Filfloc F 40-9000* | lb. | — - | .13 |
| F 6000* | lb. | — - | .36 |
| Polycel* | ton | 110.00 - | 210.00 |
| Rayon, Bleached or Dyed | lb. | .75 - | 1.20 |
| Rayon, Grey | lb. | — - | .18 |
| Rayon, Pink | lb. | — - | .20 |
| Solka-Floc* (l.c.l.) | lb. | .07 - | .16 |
| Glue, Amber | lb. | .17 - | .19 |
| Ground Softwood Bark Silvacon* (c.l.) | ton | 55.00 - | 100.00 |
| Leather | | | |
| Flour (dust) | lb. | .12 - | .15 |
| Shredded | lb. | .05 - | .17 |
| Lignin | lb. | .06 - | .08 |
| Indulin* | lb. | .06 - | .08 |
| Limestone, Pulverized | ton | 3.00 - | 5.00 |
| Asbestol Regular* | ton | 27.00 - | 29.00 |
| Asbestol Superfine* | ton | 32.00 - | 34.00 |
| Georgia Marble No. 10* | ton | — - | 11.00 |
| Industrial Filler No. 100* | ton | — - | 5.75 |
| Micro Velva A* | ton | 49.00 - | 51.00 |
| L* | ton | 57.00 - | 59.00 |
| No. 1 White* | ton | — - | 10.00 |
| Magnesium Carbonate | lb. | .12½ - | .15 |
| K & M Clearcarb* | lb. | — - | .14 |
| Technical* (c.l., eqld.) | lb. | .10½ - | .12 |
| Marinco CL* | lb. | — - | .12 |
| Magnesium Silicate (see Talc) | | | |
| Mica | lb. | .01¼ - | .07¾ |
| Concord* | lb. | .08 - | .08¾ |
| Micro-Mica* | lb. | .08 - | .08¾ |
| Mineralite* (c.l.) | ton | 40.00 - | 85.00 |
| Silversheen* | lb. | .08 - | .08¾ |
| Triple A Mica* (c.l.) | ton | — - | 30.00 |
| Vermiculite* | lb. | — - | .11 |
| Wet Ground Biotite Mica | lb. | .06½ - | .07¼ |
| Wet Ground Mica No. 160* | lb. | .08 - | .08¾ |
| Pecan Shell Flour Stan Shell* | ton | 45.00 - | 75.00 |
| Pyrophyllite | | | |
| No. 261* | ton | — - | 11.50 |
| Pyrax A* (c.l.) | ton | — - | 13.50 |
| WA* (c.l.) | ton | — - | 16.00 |
| Sawdust, Graded | ton | 14.00 - | 35.00 |
| Silica | ton | 16.00 - | 27.00 |
| DC Silica (pelleted) | lb. | 1.45 - | 1.65 |
| Extra Fine (bags) (c.l.) | ton | — - | 43.00 |
| Slate, Powdered (l.c.l.) | ton | 15.00 - | 20.00 |
| Lo-Micron Slate Flour* | lb. | — - | .04½ |
| No. 133 Slate Flour* | ton | — - | 4.55 |
| Sodium Silico Aluminate Zeolex 23* | ton | 120.00 - | 140.00 |

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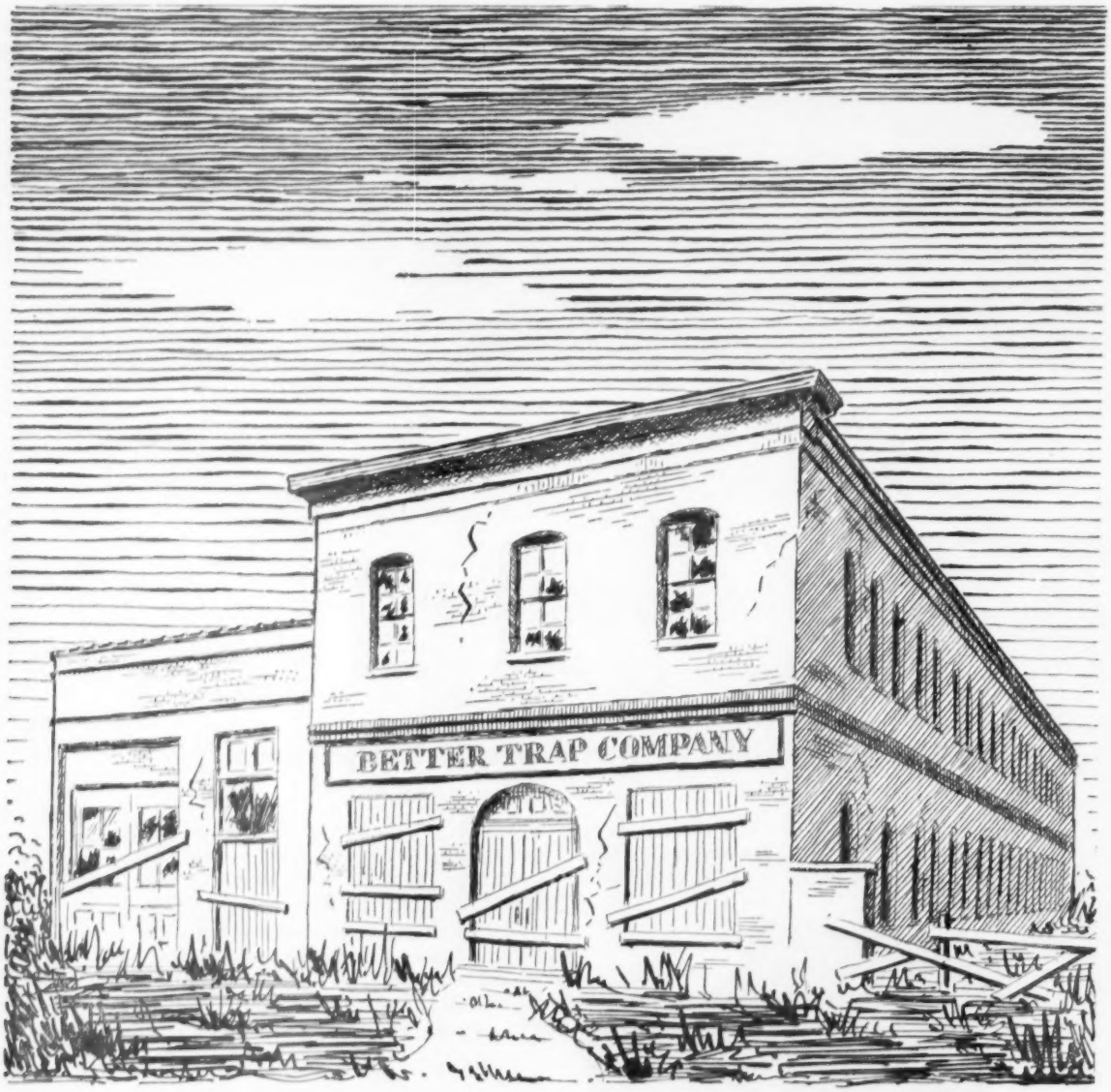


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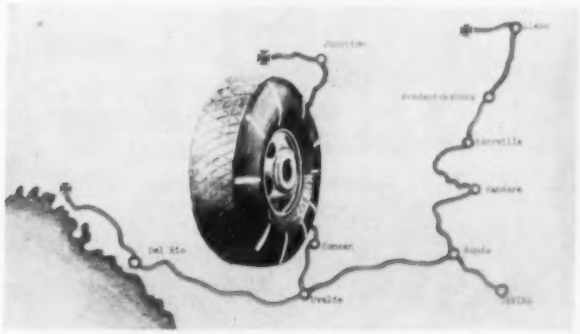

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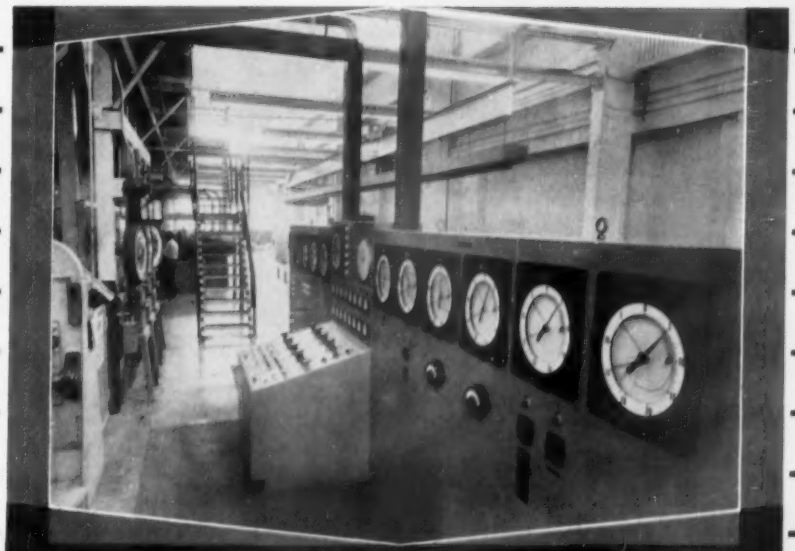

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## FILLERS (Cont'd)

| | | | |
|---|---|---|---|
| Talc (Magnesium Silicate) | | | |
| Asbestol Regular* | ton | —— | - 27.00 |
| Eastern RC-500* | ton | —— | - 32.00 |
| No. 41* | ton | —— | - 19.70 |
| No. 549* | ton | —— | - 63.00 |
| French* | ton | —— | - 59.00 |
| L.S. Silver* | ton | 33.75 | - 38.75 |
| No. 367* | ton | —— | - 13.00 |
| No. 1600* | ton | —— | - 70.60 |
| No. 1768* | ton | —— | - 13.00 |
| Nytal 200* (c.l.) | ton | —— | - 28.00 |
| 300* (c.l.) | ton | —— | - 38.00 |
| Sierra Fibrene C-400* | ton | 33.00 | - 38.00 |
| Supreme 325* | ton | 46.25 | - 57.25 |
| Sierra White* | ton | 20.75 | - 31.75 |
| Soapstone* | ton | —— | - 13.00 |
| Walnut Shell Flour | ton | 55.00 | -100.00 |
| Stan-Shell* | ton | 50.00 | - 84.00 |
| Whiting, Commercial | ton | —— | - 7.50 |
| Allied Whiting* | ton | 10.50 | - 21.50 |
| Camel-Carb* | ton | —— | - 10.00 |
| Calwhite (c.l.) | ton | —— | - 20.00 |
| C-C-O White* | ton | 20.00 | - 22.50 |
| Georgia Marble No. 15* | ton | —— | - 20.00 |
| No. 16* | ton | —— | - 20.00 |
| Pigus No. 1 YAA* (c.l.) | ton | —— | - 9.00 |
| No. 2 LS* (c.l.) | ton | —— | - 9.00 |
| Snowflake* (c.l.) | ton | —— | - 20.00 |
| Stan-White 325* | ton | 10.50 | - 13.10 |
| Veroc* (c.l.) | ton | —— | - 10.50 |
| Welco* (c.l.) | ton | —— | - 10.50 |
| York White R* (c.l.) | ton | —— | - 10.00 |
| Wood Flour | ton | 31.50 | - 48.00 |

## FINISHING MATERIALS, SURFACE

| | | | |
|---|---|---|---|
| Beaco Finishes* | gal. | 2.10 | - 2.35 |
| Black Out* | gal. | 4.50 | - 8.00 |
| Shellac, Orange Gum | lb. | .50 | - .60 |
| VanWax* | gal. | 1.45 | - 1.50 |

## FLAME RETARDANTS

| | | | |
|---|---|---|---|
| Celluflex CEF* (dms.) | lb. | —— | - .65 |
| Chlorowax 40* | lb. | .15¼ | - .17¼ |
| 50* | lb. | .16¼ | - .17¾ |
| 70* | lb. | .18½ | - .20 |
| Halowax* | lb. | .36 | - .46 |
| Zinc Borate 3167* | lb. | .1920 | - .2020 |
| Zyrox Compounds* | lb. | .38 | - .95½ |

## LATEX MODIFIERS

| | | | |
|---|---|---|---|
| Ludox | lb. | .15 | - .16¾ |
| OPD-101* | lb. | —— | - .28 |
| Piccopale A-1 Emulsion | lb. | .086 | - .107 |
| Ubatol U-2001* (dms.) | gal. | 1.84 | - 1.87 |

## LUBRICANTS, MOLD

| | | | |
|---|---|---|---|
| Akro Gel* | lb. | —— | - .165 |
| Alipal CO-433* | lb. | —— | - .20 |
| CO-436* | lb. | —— | - .24 |
| Aluminum Stearate Crown Brand* | lb. | .37 | - .42 |
| Amine, Mixed Crude* | lb. | .19 | - .25 |
| Aquadag* | lb. | 3.50 | - 4.00 |
| Aquarex D* | lb. | —— | - .78 |
| L* | lb. | —— | - .94 |
| ME* | lb. | —— | - .80 |
| MDL* | lb. | —— | - .33 |
| WAQ* | lb. | —— | - .22 |
| Armeen HT* | lb. | .34 | - .40 |
| 180* | lb. | .52 | - .56 |
| Armid HT (flaked)* | lb. | .42 | - .46 |
| 0* | lb. | .39 | - .41 |
| Borax, Granular (l.c.l.) | ton | 89.00 | - 94.00 |
| Carbowax 4000* | lb. | .31 | - .32 |
| CD Mold Release B* | gal. | 5.00 | - —— |
| B-2* | gal. | 5.00 | - —— |
| Colite Concentrate* (dms.) | gal. | .90 | 1.15 |
| Colite D43D* | gal. | 1.15 | 1.40 |
| Concentrex* | lb. | —— | - .25 |
| Dag Dispersions No. 197* | lb. | 1.85 | 2.90 |
| D.C. 7 Compound* | lb. | 5.13 | 6.50 |
| D.C. Emulsion No. 7* | lb | 1.59 | 2.07 |
| No. 8* | lb. | 1.22 | - 1.76 |
| No. 35* | lb. | 1.22 | - 1.76 |
| No. 35A* | lb. | 1.22 | - 1.76 |
| No. 35B* | lb. | 1.22 | - 1.76 |
| No. 36* | lb. | 1.22 | - 1.76 |
| D.C. Mold Release Fluid* | lb. | 3.14 | - 4.75 |
| Dri-Lube* | lb. | —— | - .22 |
| Emulsion Lubricant A80* | lb. | —— | - 1.80 |
| 45* | lb. | —— | - 1.80 |
| G-E Silicone Emulsion SM-55* | lb. | 1.22 | - 1.76 |
| SM-61* | lb. | 1.22 | - 1.76 |
| SM-62* | lb. | 1.22 | - 1.76 |
| G-E Silicone Fluid SF-93* | lb. | 3.14 | - 4.25 |
| SF-96* | lb. | 3.14 | - 4.25 |
| Glydag G* | lb. | 1.30 | - 2.45 |
| Hawkeye Flake* (dlvd.) | lb. | .15 | - .15¾ |
| HSC No. 35* | lb. | 1.22 | - 2.46 |
| No. 515 | lb. | 1.22 | - 2.46 |
| Igepal CO-430* | lb. | —— | - .29 |
| CO-630* | lb. | —— | - .29 |
| CO-530* | lb. | —— | - .29 |
| Igepon AP-78* | lb. | —— | - .48 |
| T-33* | lb. | —— | - .21 |
| T-51* | lb. | —— | - .13½ |

## LUBRICANTS, MOLD (Cont'd)

| | | | |
|---|---|---|---|
| Kokobace R* | lb. | .17½ | - .18½ |
| Lubrex | lb. | .25 | - .30 |
| Lubri-Flo* | gal. | 10.00 | - 12.00 |
| Migralube* | lb. | —— | - .35 |
| ML-1027-2C* | gal. | —— | - 2.15 |
| ML-1028-2C* | gal. | —— | - 2.15 |
| Mold Lubricant No. 72 Conc.* (dms.) | gal. | —— | - 1.90 |
| No. 735* (dms.) | gal. | —— | - 1.25 |
| No. 769* (dms.) | gal. | —— | - 1.20 |
| No. 825* (dms.) | gal. | —— | - 2.00 |
| No. 856* (dms.) | gal. | —— | - 1.90 |
| No. 880* (dms.) | gal. | —— | - 1.19 |
| No. 887* (dms.) | gal. | —— | - 1.80 |
| No. 896* (dms.) | gal. | —— | - 1.28 |
| No. 935* (dms.) | gal. | —— | - 1.56 |
| No. 956* (dms.) | gal. | —— | - 2.50 |
| No. 965* (dms.) | gal. | —— | - 2.15 |
| No. 967* (dms.) | gal. | —— | - 2.40 |
| No. 969* (dms.) | gal. | —— | - 1.50 |
| No. 975* (dms.) | gal. | —— | - 2.85 |
| No. 980* (dms.) | gal. | —— | - 1.53 |
| No. 987* (dms.) | gal. | —— | - 2.45 |
| Moldeze No. 3* | gal. | —— | - 4.95 |
| Mold-Brite* | gal. | —— | - 1.50 |
| Monopole Oil MD* | lb. | —— | - .16 |
| Olate Flakes* | lb. | .22 | - .23 |
| Orvus WA Paste* (dms.) | lb. | —— | - .22 |
| Plaskon Polyethylene S* | lb. | .32 | - .47 |
| Polyglycol 15-200* | lb. | .25 | - .28¾ |
| E4000* | lb. | .31 | - .37 |
| Prodag* | lb. | .28 | - .42 |
| Purity Flake* (dlvd.) | lb. | .18 | - .19¾ |
| Rubber-Flo* | gal. | 1.25 | - 2.00 |
| Rubber-Glo* | gal. | —— | - .94 |
| Rusco Mold Paste* | lb. | —— | - .25 |
| Sericite* (l.c.l.) | ton | 65.00 | - 75.00 |
| Silicone Oil A145* | lb. | 3.18 | - 3.61 |
| Silrex (dms.) | lb. | —— | - .65 |
| A65* | lb. | 2.50 | - 2.75 |
| Soybean Lecithin | lb. | .13 | - .17 |
| Thermalube* | lb. | —— | - .13¾ |
| UC Silicone L-45* | lb. | 3.14 | - 4.75 |
| L-522* | lb. | 3.05 | - 4.05 |
| LE-45* | lb. | 1.22 | - 1.70 |
| LE-450* | lb. | 1.22 | - 1.70 |
| Ucon Lubricants* | lb. | .26¼ | - .27¾ |
| Ulco Mold Soap* | lb. | .15 | - .29 |

## LUBRICANTS, RUBBER

| | | | |
|---|---|---|---|
| Diglycol Stearate Neutral (and SE) (dms.) | lb. | —— | - .25 |
| Extrud-o-Lube* | gal. | 1.33 | - 1.54 |
| G.B. Naphthenic Neutrals* | gal. | .11 | - .18 |
| Ivory Chips* | lb. | .18¼ | - .19¼ |
| Latex-Lube GR* (dlvd.) | lb. | .19¼ | - .20 |
| No. 82-A* (450 lb. dms.) | lb. | —— | - .08½ |
| Propylene Stearate (dms.) | lb. | .35 | - .60 |

## LUBRICANTS, RUBBER SURFACE

| | | | |
|---|---|---|---|
| Barium Stearate | lb. | .41 | - .46 |
| Calcium Stearate | lb. | .39 | - .44 |
| Crown Brand* | lb. | .37 | - .42 |
| D.C. 7 Compound* | lb. | 5.13 | - 6.50 |
| D.C. 200 Fluid* | lb. | 3.14 | - 4.75 |
| ELA* | lb. | —— | - .82 |
| G-E Silicone Fluid SF-92* | lb. | 3.14 | - 4.25 |
| Glycerized Lubricant* | gal. | 1.25 | - 1.48 |
| Glydag B* | lb. | 1.50 | - 2.10 |
| G* | lb. | 1.30 | - 2.45 |
| Glyso-Lube* (dms.) | lb. | —— | - .14 |
| No. 3* (dms.) | lb. | —— | - .14 |
| HSC No. 35* | lb. | 1.28 | - 1.34 |
| No. 515* | lb. | 1.28 | - 1.34 |
| Hydro-Zinc* | lb. | —— | - .20 |
| Latex-Lube Pigmented* (dlvd.) | lb. | .17¼ | - .18¼ |
| R-66* | lb. | —— | - .16½ |
| Liqui-Lube* (dlvd.) | lb. | —— | - .16¾ |
| N.F.* (dlvd.) | lb. | —— | - .16¾ |
| N.T.* (dlvd.) | lb. | —— | - .16¾ |
| Lubrex* | lb. | .25 | - .30 |
| Lubri-Cote | gal. | .86 | 1.00 |
| Magnesium Stearate Crown Brand* | lb. | .40 | - .45 |
| Polyethylene Glycol | lb. | .22 | - .26 |
| Rubber Free (Concentrate)* | gal. | —— | - 1.44 |
| Jel* | lb. | .18 | - .21½ |
| Slab-Dip* (dms.) | lb. | —— | - .15 |
| Soybean Lecithin | lb. | .13 | - .17 |
| Stock-Lube* | lb. | —— | - .19 |
| UC Silicone L-45* | lb. | 3.14 | - 4.75 |
| L-522* | lb. | 3.05 | - 4.05 |
| LE-450* | lb. | 1.22 | - 1.70 |
| Zinc Stearate | lb. | .41 | - .46 |

## MOLD CLEANERS

| | | | |
|---|---|---|---|
| Actusol* (dlvd.) | gal. | 1.45 | - 1.65 |
| Alkon* (dlvd.) | lb. | .16 | - .16½ |
| CA-301* | gal. | —— | - 2.49 |
| CA-302* | gal. | —— | - 2.63 |
| G-O 6910* | lb. | .38 | - .40 |
| Metso Anhydrous* | cwt. | 5.70 | - 7.95 |
| Metso 99* | cwt. | 5.00 | - 7.25 |
| 200* | cwt. | 6.70 | - 8.95 |
| Granular* | cwt. | 4.45 | - 6.70 |
| Orvus Extra Granules* | lb. | .22½ | - .23½ |
| Rubber-Sol* | gal. | 2.97 | - 3.97 |
| Sprex A.C.* (dlvd.) | lb. | .17¾ | - .18¾ |
| Zip Mold Cleaner* | gal. | .95 | - 1.45 |

## PEPTIZING AGENTS

| | | | |
|---|---|---|---|
| Peptizer P-12* | lb. | .95 | - 1.25 |
| Pepton 22 Plasticizer* | lb. | .81 | - .84 |
| 65* | lb. | 1.20 | - 1.23 |
| 65B* | lb. | .81 | - .84 |
| RPA 2* | lb. | —— | - .82 |
| 3* | lb. | —— | - .48 |
| 3 Conc.* | lb. | —— | - .85 |
| 5* | lb. | —— | - .68 |
| 6* | lb. | —— | - 1.62 |

## PLASTICIZERS & SOFTENERS

| | | | |
|---|---|---|---|
| Acto 500* | lb. | —— | - .09 |
| Adipol BCA* | lb. | .45 | - .45½ |
| 2EH* | lb. | .42½ | - .43½ |
| 10A* | lb. | .42½ | - .43½ |
| ODY* | lb. | .47½ | - .48½ |
| 810* | lb. | .42½ | - .45½ |
| XX* | lb. | .42½ | - .43½ |
| Anhydrol 6990* | lb. | .51 | - .56 |
| Arneel SD* | lb. | .34 | - .40 |
| Arolene 1980* (c.l.) | lb. | —— | - .10 |
| Aromatic Plasticizer 10* (and 25*) (dms.) | lb. | .05 | - .06½ |
| Aromatic Tar | gal. | .0573 | - .1973 |
| Bardol* | lb. | .02¾ | - .03¾ |
| B* | lb. | .06¼ | - .06½ |
| Bayol D* | gal. | —— | - .382 |
| F* | gal. | —— | - .52 |
| Beeswax, Bleached | lb. | .76 | - .79 |
| Yellow Refined | lb. | .68 | - .70 |
| Bondogen* | lb. | .55½ | - .60½ |
| B.R.C. No. 20* | lb. | .0150 | - .0175 |
| No. 21* | lb. | .02¼ | - .03 |
| No. 22* | lb. | .02½ | - .02¾ |
| B.R.H. 2* | lb. | .0213 | - .0351 |
| BRS 700* | lb. | .0200 | - .0285 |
| B.K.T. 3* | lb. | .0180 | - .0265 |
| 4* | lb. | .0250 | - .0260 |
| 7* | lb. | .0300 | - .0310 |
| B.R.V.* | lb. | .0475 | - .0565 |
| Bunarex Resins* | lb. | .07 | - .08 |
| Bunatak AH* | lb. | —— | - .09½ |
| N* | lb. | —— | - .31 |
| U* | lb. | —— | - .17½ |
| No. 90* | lb. | —— | - .09 |
| No. 210* | lb. | —— | - .14 |
| Butac* | lb. | .12½ | - .13½ |
| Butyl Carbitol Periargonate (dms.) | lb. | —— | - .64½ |
| Butyl Cellosolve Periargonate (dms.) | lb. | —— | - .68 |
| Butyl Oleate | lb. | .25½ | - .26½ |
| Butyl Palmitate | lb. | —— | - .26½ |
| Butyl Stearate (dms.) | lb. | .24½ | - .25½ |
| BWH-1* | lb. | .16 | - .17 |
| Cabflex DDA* | lb. | .40 | - .43½ |
| DDP* | lb. | .29½ | - .33 |
| Di-BA* | lb. | .41 | - .44½ |
| Di-OA* | lb. | .40 | - .43½ |
| Di-OP* | lb. | .28½ | - .32 |
| Di-OZ* | lb. | .45½ | - .49 |
| DOA* | lb. | .40 | - .43½ |
| DOP* | lb. | .28½ | - .32 |
| HS-10 | lb. | .44 | - .47½ |
| ODA* | lb. | .40 | - .43½ |
| ODP* | lb. | .29 | - .32½ |
| TCP* | lb. | .34½ | - .38 |
| Califlux 510* (and 550*) | lb. | .02½ | - .03¼ |
| G.P.* | lb. | .01¾ | - .02 |
| R-100* | lb. | .04½ | - .05¼ |
| TT* | lb. | .0170 | - .0245 |
| Candelilla Wax, Prime | lb. | .70 | - .74 |
| Refined Light | lb. | .73 | - .78 |
| Carbowax 4000* (dms.) | lb. | .31 | - .32 |
| Carnauba Wax, Crude | lb. | .71 | - .77 |
| Flaked | lb. | .72 | - 1.55 |
| Refined, Technical | lb. | .72 | - .80 |
| Refined, Pure | lb. | .80 | - .86 |
| Yellow | lb. | 1.42 | - 1.45 |
| Celluflex* (dms.) 112* (t.c., dlvd.) | lb. | —— | - .34½ |
| 179-A* (t.c., dlvd.) | lb. | —— | - .32½ |
| 179-C* (t.c., dlvd.) | lb. | —— | - .32½ |
| 179-EG* (t.c., dlvd.) | lb. | —— | - .32½ |
| DBP* (t.c., dlvd.) | lb. | —— | - .30 |
| DOP* (t.c., dlvd.) | lb. | —— | - .28½ |
| TPP* (dms., eqld.) | lb. | —— | - .40 |
| Ceresin Wax | lb. | .12 | - .30 |
| Chlorowax 40* | lb. | .15¼ | - .17¼ |
| 50* | lb. | .16¾ | - .17¾ |
| 70* | lb. | .18½ | - .20 |
| LV* | lb. | .17¼ | - .19¼ |
| CTLA Polymer* | gal. | .20 | - .36 |
| Cumar Resins* | lb. | .07 | - .19 |
| Darex DBP* | lb. | .30 | - .33 |
| DOP* | lb. | .30½ | - .33½ |
| DIOP* | lb. | .30½ | - .33½ |
| D.B.M.* | lb. | .32 | - .34¼ |
| Decylbutyl Phthalate | lb. | .27 | - .29½ |
| Degras, Common | lb. | —— | - .14 |
| Diallyl Phthalate | lb. | .51½ | - .52½ |
| Dibenzyl Sebacate | lb. | .88 | - .89½ |
| Dibutoxyethyl Sebacate | lb. | —— | - .56¾ |
| Dibutyl Phthalate | lb. | .30 | - .33½ |
| Dibutyl Sebacate | lb. | .64½ | - .66 |
| Dicapryl Adipate | lb. | .42 | - .44 |
| Dicapryl Phthalate | lb. | .29½ | - .31 |
| Dicapryl Sebacate | lb. | .58 | - .59½ |
| Di-Carbitol Phthalate (dms.) | lb. | .42 | - .42½ |
| Dicyclohexyl Phthalate | lb. | .58¼ | - .59¼ |
| Diethyl Phthalate (t.c.) | lb. | .25 | - .27¾ |
| Di-2-ethylhexyl Phthalate | lb. | —— | - .30½ |
| Dihexyl Adipate | lb. | .40 | - .42½ |
| Dihexyl Phthalate | lb. | .30 | - .32½ |

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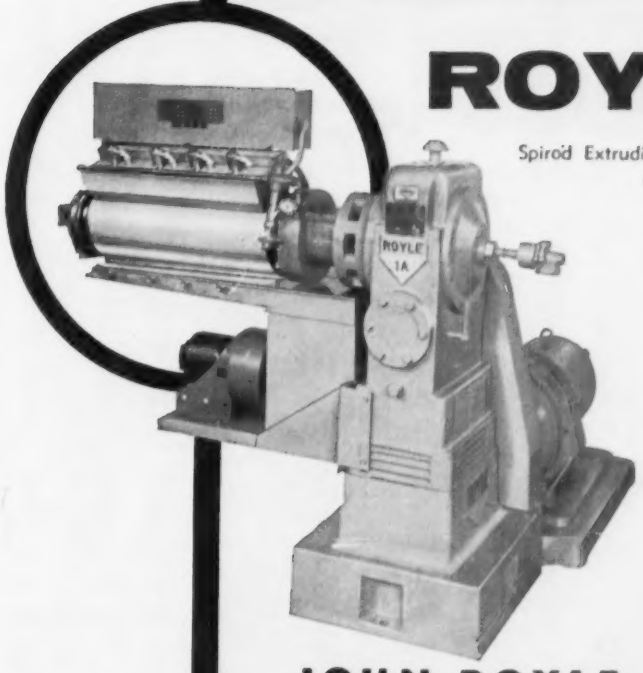


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## PLASTICIZERS & SOFTENERS (Cont'd)

| | | | |
|---|---|---|---|
| Dihexyl Sebacate | lb. | .62 | .63½ |
| Diisobutyl Azelate | lb. | —— | .47¾ |
| Di-iso-octyl Adipate | lb. | .40 | .42½ |
| Di-iso-octyl Phthalate (t.c.) | lb. | .30½ | .33 |
| Dimethyl Phthalate (t.c.) | lb. | .27½ | .30¼ |
| Dimethyl Sebacate | lb. | 1.25 | 1.26½ |
| Dinonyl Adipate | lb. | .44½ | .47½ |
| Dinopol 235* | lb. | .38 | .39 |
| IDO* | lb. | .31½ | .32½ |
| MOP* | lb. | .35 | .36 |
| Dioctyl Adipate | lb. | .40 | .42½ |
| Dioctyl Phthalate (dms.) | lb. | .31 | .32 |
| Dioctyl Sebacate (dms.) | lb. | .58½ | .60 |
| D.I.O.P. (dms.) | lb. | .31 | .32 |
| Dipolymer Oil | gal. | .33 | .48 |
| Dispersing Oil No. 10* | lb. | .06 | .06¼ |
| Dutrex 6* | gal. | —— | .11 |
| 15E* | gal. | —— | .10 |
| Elastex 10-P* | lb. | .30½ | .33½ |
| 50-B* | lb. | .25 | .28 |
| DCHP* | lb. | .59 | .60 |
| Emulphor EL-719* | lb. | —— | .58 |
| Epoxy Plasticizer | lb. | .33½ | .36 |
| Drapex 3.2* | lb. | .39¼ | .44 |
| Drapex 4.4* | lb. | .37 | .42 |
| Esparto Wax | lb. | —— | .55 |
| Estac* | lb. | —— | .16 |
| Facile Gum 4A* | lb. | .48 | .50 |
| Flexol B-400* | lb. | .27½ | .28½ |
| DOP* | lb. | .33 | .34 |
| TOF* | lb. | .45½ | .46½ |
| 3GH* | lb. | .46 | .46¾ |
| 3GO* | lb. | .55 | .55¾ |
| 4GO* | lb. | .35 | .36 |
| 426* | lb. | .29½ | .30½ |
| Flexricin P-1* | lb. | —— | .32 |
| P-4* | lb. | —— | .34¼ |
| P-6* | lb. | —— | .41½ |
| P-8* | lb. | —— | .34¼ |
| Fortex A* (dms.) | lb. | .12½ | .14½ |
| Galex W-100* | lb. | .15½ | .19¼ |
| G.B. Asphaltic Flux* | gal. | .10 | .18 |
| G.B. Light Process Oil* | lb. | .02½ | .03¼ |
| Medium Process Oil* | lb. | .03½ | .04¼ |
| G.B. Naphthenic Neutrale* | gal. | .11 | .18 |
| Good-rite GP233* | lb. | .40 | .43½ |
| GP235* | lb. | .40 | .43½ |
| GP236* | lb. | .40 | .43½ |
| GP261* | lb. | .28 | .31½ |
| GP265* | lb. | .28½ | .32 |
| GP266* | lb. | .29 | .32½ |
| GP-266-BPA* | lb. | .29 | .32½ |
| Harflex 500* (dms.) | lb. | .31½ | .34 |
| HB20* | lb. | .15 | .17 |
| HB40* | lb. | .19 | .22 |
| Herron-H.T.* | gal. | .16 | .27 |
| Herron-Plas* | lb. | —— | .03¾ |
| Herron-Wax* | lb. | .05¼ | .06 |
| No. 23* | lb. | .08¼ | .08¾ |
| No. 24* | lb. | .07¼ | .07¾ |
| HSC No. 13* | lb. | .25 | .32 |
| No. 28 and 38* | lb. | .20 | .27 |
| Indonex 632½* (633½*, 634½*, 637½*) | gal. | .12 | .19 |
| Isooctyl Decyl Phthalate | lb. | .30½ | .33½ |
| Kapsol* | lb. | .35 | .35½ |
| Kenflex* | lb. | .18 | .27 |
| Kessoflex 101* (dms.) | lb. | —— | .37½ |
| 103* (dms.) | lb. | —— | .38 |
| MCO* (dms.) | lb. | —— | .35½ |
| BCL* (dms.) | lb. | —— | .37½ |
| MCP* (dms.) | lb. | —— | .41 |
| BCP* (dms.) | lb. | —— | .36 |
| KP 23* | lb. | .31½ | .32½ |
| 90* | lb. | .42½ | .43½ |
| 140* | lb. | .48 | .48½ |
| 201* | lb. | .58 | .59 |
| 220* | lb. | .34½ | .35½ |
| 555* | lb. | .56½ | .57 |
| Kremol 40* | gal. | .36 | .46 |
| 50* | gal. | .39 | .49 |
| Kronisol* (dms.) | lb. | .33 | .36 |
| Kronitex AA* (dms.) | lb. | .35 | .36 |
| I* (dms.) | lb. | .35 | .36 |
| K-3* | lb. | .35 | .36 |
| MX* | lb. | .35 | .36 |
| Lanolin, Tech. Anhydrous | lb. | —— | .26 |
| Latex-Lube G.R.* | lb. | .19¼ | .20 |
| Lead Oleate | lb. | —— | .29¾ |
| Lindol* (dms., t.c.) | lb. | —— | .32½ |
| Locusol No. 1-6980* | lb. | .30 | .34 |
| 2-Mercaptoethanol (dms.) | lb. | 1.25 | 1.50 |
| Methox* | lb. | .40½ | .41 |
| Methyl Laurate | lb. | .25 | .27 |
| Methyl Oleate | lb. | —— | .20 |
| Methyl Stearate (dms.) | lb. | —— | .30 |
| Monoplex DOS* | lb. | .59½ | .60½ |
| DBS* | lb. | .65½ | .66½ |
| S-70* | lb. | .41 | .42 |
| S-71* | lb. | .46½ | .47½ |
| Montan Wax, Crude | lb. | .26 | .35 |
| Flaked | lb. | .29 | .40 |
| Morflex* | lb. | .32 | .69½ |
| MR 2088* (dms.) | lb. | —— | .19 |
| Natac* | lb. | .12 | .13 |
| Nebony Resins* (dms.) | lb. | .04½ | .05 |
| Neolene 210* (t.c.) | lb. | —— | .16 |
| 212* (t.c.) | lb. | —— | .14 |
| 220* (t.c.) | lb. | —— | .15 |
| Nerium* | lb. | —— | .09 |
| Nevillac Resins* (dms.) | lb. | .31 | .85 |
| Neville LX-880* (dms.) | lb. | .12 | .13½ |
| LX-685* (dms.) | lb. | .12½ | .17½ |
| Neville Resins* (dms.) | lb. | .07¼ | .20 |
| Nevindene Resins* (dms.) | lb. | .16½ | .20 |
| Nevinol* (dms.) | lb. | —— | .24 |

## PLASTICIZERS & SOFTENERS (Cont'd)

| | | | |
|---|---|---|---|
| Nuba 1* (and 2*) (dms.) | lb. | .06¼ | .06¼ |
| No. 480 Oil Proof Resin* | lb. | —— | .18 |
| Ohopex Q10* (dms.) | lb. | .32 | .33 |
| R9* (dms.) | lb. | .37¼ | .37¼ |
| Ortho-Nitrobiphenyl | lb. | .13 | .15 |
| Ozokerite Wax, White and Yellow | lb. | .24 | .31 |
| Paradene Resins (dms.) | lb. | .07¼ | .08 |
| No. 2 Flaked | lb. | .08 | .08½ |
| Para Flux* (dms.) | gal. | .19¼ | .20¼ |
| 2016* (dms.) | gal. | .22 | .23 |
| Para Lube* (t.c.l.) | lb. | .046 | .048 |
| Paraplex G-25* | lb. | .76 | .77 |
| G-40* | lb. | .50 | .51 |
| G-50* | lb. | .40¾ | .41¼ |
| G-53* | lb. | .45 | .46 |
| G-60* (and G-61*) | lb. | .35 | .36 |
| G-62* | lb. | .37 | .38 |
| Parmo* | lb. | .06 | .13½ |
| Pepton 22 Plasticizer* | lb. | .81 | .84 |
| PG-16* | lb. | —— | .35 |
| Philrich-5* (t.c.) | gal. | —— | .11 |
| Picco 10* (and 25*) | lb. | .15 | .17 |
| 60* (and 75*) | lb. | .15 | .17 |
| 100* | lb. | .15 | .17 |
| Piccocizer 30* | lb. | .05½ | .07 |
| Piccolastic A* (B*, C*, D* & E*) | lb. | .28 | .29 |
| FT* (FHF* & FX*) | lb. | .1815 | .1965 |
| T-135* | lb. | .22¾ | .23¼ |
| Piccolyte S Resins* | lb. | .20½ | .22¾ |
| Piccopale Resins* | lb. | .12 | .13 |
| Piccoumaron Resins* | lb. | .07 | .24½ |
| Pigmentar* | lb. | .0460 | .0745 |
| Pigmentaroil* | lb. | .0460 | .0745 |
| Plastac M* | lb. | —— | .09¼ |
| Plasticizer 2286* | lb. | —— | .26¼ |
| Plasticizer 4141* | lb. | .56¾ | .66¾ |
| Plasticizer DP-200, DP-250, DP-520* | lb. | .42¼ | .46¼ |
| Plasticizer LP* | lb. | —— | .07 |
| Plasticizer MP* | lb. | —— | .08 |
| Plasticizer MT-511* | lb. | —— | .68¼ |
| Plasticizer ODN* | lb. | .35 | .41 |
| Plasticizer SC* | lb. | .42½ | .43½ |
| Plasticizer W-13* | lb. | .37 | .38¾ |
| Plastoflex 3* | lb. | —— | .52 |
| 52* | lb. | .37¼ | .38¾ |
| VS* | lb. | .41¾ | .42¾ |
| Plastogen* | lb. | .08¾ | .08½ |
| Plastolein 9050* (c.l.) | lb. | .54½ | .56½ |
| 9055* | lb. | .30½ | .32½ |
| 9058* | lb. | .48 | .50 |
| 9250* | lb. | .38¾ | .40¼ |
| 9715* | lb. | .39 | .40 |
| Plastone* | lb. | .23 | .27 |
| Polycizer 162* | lb. | .28 | .31½ |
| 332* | lb. | .40 | .42½ |
| 562* | lb. | .28½ | .32 |
| 662* | lb. | .30½ | .33 |
| 532 and 632* | lb. | .40 | .42½ |
| ED* | lb. | —— | .51 |
| Polyco 438* | lb. | .34 | .35 |
| Polymel C-130* | lb. | .13¾ | .14¼ |
| D* | lb. | .22½ | .23½ |
| 6* | lb. | .05¾ | .07¼ |
| Process Oil C-255* (c.l.) | gal. | —— | .22 |
| Propylene Stearate (dms.) | lb. | —— | .32 |
| PRR 1* | gal. | .15 | .35 |
| PT 67 Light Pine Oil* (dms.) | gal. | —— | .60 |
| 101 Pine Tar Oil* (t.c., dms.) | gal. | .0460 | .0634 |
| 400 Pine Tar* (600* & 800*) (t.c., dms.) | lb. | .0460 | .0634 |
| PX-104* | lb. | .30 | .32½ |
| PX-108* | lb. | .30½ | .33 |
| PX-138* | lb. | .32½ | .33½ |
| PX-208* | lb. | .44½ | .45½ |
| PX-238* | lb. | .44½ | .45½ |
| PX-404* | lb. | .66 | .67 |
| PX-438* | lb. | .60 | .61 |
| PX-800* | lb. | .34 | .35 |
| PX-917* | lb. | .36½ | .37½ |
| Reogen* | lb. | .13¾ | .14 |
| 465 Resin* (dms.) | lb. | .07½ | .08 |
| Resin C* | lb. | .0225 | .0310 |
| Resinex* | lb. | .03¼ | .04¼ |
| L-4* | lb. | .02¼ | .03¼ |
| Rexflex* | lb. | —— | .15 |
| Rosin Oil | gal. | .80 | 1.35 |
| RR-10 (Neoprene)* | lb. | —— | .37 |
| R.S.O. Softening Oil* | lb. | .03 | .05 |
| RuBars* | lb. | .19¼ | .20 |
| Rubberol* | lb. | .18 | .25¼ |
| Santicizer B-16* | lb. | .48¾ | .49¼ |
| E-15* | lb. | .52¾ | .53¼ |
| M-17* | lb. | .44¾ | .45¼ |
| No. 140* | lb. | .32½ | .36 |
| No. 141* | lb. | .36 | .37 |
| No. 160* | lb. | .28½ | .29½ |
| No. 602* | lb. | —— | .30½ |
| No. 603* | lb. | —— | .27 |
| Sherolatum* | lb. | .03½ | .06 |
| Staflex DBES* | lb. | .58 | .60½ |
| DOS* | lb. | .58 | .60½ |
| IXA* | lb. | .32 | .35 |
| KA* | lb. | .36 | .38¾ |
| Stan Chlor Oils* | lb. | .13½ | .20½ |
| 70* | lb. | .17½ | .30 |
| Stanolind Petrolatum* | lb. | .07 | .156 |
| Wax* | lb. | .31 | .33 |
| Sunny South Burgundy Pitch* | lb. | .1030 | .1085 |
| Pine Tar* | lb. | .0460 | .0801 |
| Pine Tar Oil* | lb. | .0460 | .0745 |
| Rosin Oil* | gal. | .58 | .87½ |

## PLASTICIZERS & SOFTENERS (Cont'd)

| | | | |
|---|---|---|---|
| Superla Wax* | lb. | .30 | .397 |
| Syncera Wax* | lb. | .16 | .267 |
| Syn Tac* (c.l.) | gal. | —— | .33 |
| Synthetic Revertant Oil | lb. | —— | .16 |
| Tar, Refined | gal. | .1200 | .1760 |
| Tarpine | lb. | .035 | .050 |
| Terpene A* | gal. | —— | .65 |
| TP-90B* | lb. | .59 | .69 |
| TP-95* | lb. | .65 | .7[illegible] |
| Transphalt Resins* | lb. | .02¼ | .04¾ |
| Tributyl Phosphate | lb. | .52½ | .53½ |
| Tricresyl Phosphate | lb. | .32½ | .36 |
| Turgum S* | lb. | .10¼ | .11¾ |
| Vanadinet B* | lb. | .036 | .07 |
| C* | lb. | .031 | .06 |
| MR 80 Mesh* | lb. | .08½ | .12½ |
| Vistac No. 1* | gal. | 1.00 | 1.21 |
| P* | lb. | .18 | .18½ |
| Vopcolene 50* | lb. | —— | .31 |
| Witcizer 100* | lb. | .20¼ | .21¾ |
| 200* | lb. | .20¼ | .21¾ |
| 201* | lb. | .22¾ | .25¼ |
| 300* | lb. | .30 | .33½ |
| 312* | lb. | .30½ | .34 |
| 313* | lb. | .30½ | .34 |
| 412* | lb. | .42½ | .46 |
| Witresin* | ton | —— | 52.50 |

## PROCESSING AIDS

| | | | |
|---|---|---|---|
| Castor Oil, Blown (dms.) | lb. | —— | .21 |
| Refined (dms.) | lb. | —— | .18½ |
| Castorwax* | lb. | —— | .24½ |
| Dutrex 7* | lb. | .12 | .20 |
| ELA* | lb. | —— | .82 |
| Hydrofol Glycerides 200* | lb. | .15½ | .19¾ |
| Kenflex N* | lb. | —— | .18 |
| Maleic Anhydride | lb. | —— | .27 |
| Millrex* | lb. | —— | .15 |
| Nadic Anhydride | lb. | —— | .75 |
| Polycin* | lb. | —— | .24½ |
| Resin No. 510* | lb. | .19 | .26 |
| No. 529* | lb. | .25 | .32 |
| Pulverized* | lb. | .20½ | .25 |
| Thiomalic Acid | lb. | —— | 3.50 |
| Zyrox* | lb. | .78 | .88 |

## PROTECTIVE & STABILIZING AGENTS

| | | | |
|---|---|---|---|
| Acacia* | lb. | .12¼ | .21 |
| Alpha Protein | lb. | —— | .23 |
| Aroostoocrat* | lb. | —— | .07½ |
| Carob Bean Flour | lb. | —— | .50 |
| Casein | lb. | .32 | .38 |
| Emcol K-8300* (dms.) | lb. | .14 | .18 |
| Ethylene Diamine 68% | lb. | .44 | .47 |
| Gum Arabic | lb. | —— | .23 |
| Karaya Gum | lb. | —— | .35 |
| Locust Bean Gum | lb. | —— | .50 |
| Prosein* | lb. | —— | .06 |
| Stablex B* | lb. | .50 | .95 |
| K* | lb. | .27 | .35 |

## RECLAIMING AGENTS

| | | | |
|---|---|---|---|
| Amalgamator Z-4* | lb. | .32 | .33 |
| Armeen C* | lb. | .46 | .52 |
| Mixed Crude* | lb. | .19 | .25 |
| T* | lb. | .32 | .38 |
| Burco RA* | lb. | .051 | .081 |
| C-6 Oil* (28* & 32*) | gal. | .33 | .38 |
| C-10 Oil* | gal. | .25 | .30 |
| C-33* (t.c.) | gal. | —— | .21½ |
| C-42* (t.c.) | gal. | —— | .23 |
| Caustic Soda—Flake 76% (c.l., dms.) | cwt. | —— | 4.50 |
| Liquid 50% (t.c.) | cwt. | —— | 2.80 |
| Solid 76% (c.l., dms.) | cwt. | —— | 4.10 |
| Cresylic Acid (99-100%) | gal. | .85 | 1.39 |
| D-4* (t.c.) | gal. | —— | .27 |
| E-5* (t.c.) | gal. | —— | .25 |
| Flake Calcium Chloride (77-80%) | ton | —— | 29.00 |
| G.B. Reclaiming Oil* | gal. | .12 | .18 |
| CD-10* | gal. | .10 | .16 |
| CD-50-U* | gal. | .18 | .24 |
| Gensol No. 6* (t.c.) | gal. | —— | .40 |
| Heavy Aromatic Naphtha | gal. | .13¼ | .18½ |
| LX-77 Reclaiming Solvent* | gal. | .21 | .33 |
| LX-572 Reclaiming Oil* | gal. | .27 | .32 |
| LX-777 Reclaiming Oil* | gal. | .23 | .33 |
| Neo-Fat D-242* | lb. | .05½ | .07¾ |
| 42-70* | lb. | .08½ | .10½ |
| No. 517 H.B. Oil* | gal. | .11½ | .16½ |
| 535* | gal. | .22 | .27 |
| PT 67 Light Pine Oil* (dms.) | gal. | —— | .60 |
| PT 101 Pine Tar Oil* (t.c., dms.) | gal. | .0460 | .0634 |
| PT 150 Pine Solvents* (dms.) | gal. | —— | .44 |
| Q Oil* (t.c.) | gal. | —— | .286 |
| Reclaiming Oil 3186-G* | gal. | .25 | .36½ |
| Reclaiming Reagent No. 1431* | lb. | .21 | .25 |
| R.P.A. No. 3* | lb. | —— | .47 |
| RR-10* | lb. | —— | .37 |
| Soda Ash (c.l., bags) | cwt. | —— | 1.75 |
| Solvent 534* | gal. | .20½ | .26½ |
| Solvent Oil 21* | gal. | .24 | .29 |
| C-42* | gal. | .23 | .38 |
| X-1 Resinous Oil* | lb. | .0225 | .0325 |

# CUTTER

This new, low-cost cutter will efficiently cut stock up to 3" thick and 13" wide. Available in several models with different blade lengths. Cutter has an open end, allowing simplified operation, and is so constructed that stock is easily placed under the cutting blade. Requires little effort, delivers high power and accuracy. Ideal for rubber, vinyl, leather, paper, etc.

**FAST EASY ACCURATE**

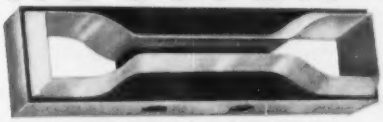
SUPERIOR also makes a low-cost Splicing Vulcanizer with a wide temperature range for splicing gaskets, etc.

*Write today for information on SUPERIOR Cutters and Vulcanizers.*

**SUPERIOR MANUFACTURING COMPANY, Chicago Street, Painesville, Ohio**

# HOGGSON TOOLS, MOLDS, DIES

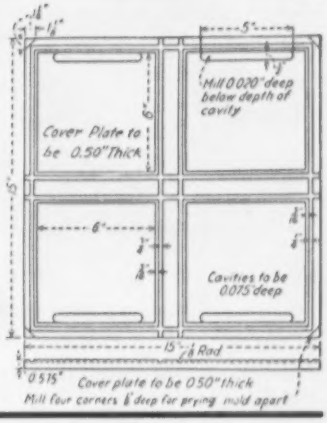
## For Rubber Testing and Production



"DUMBELL" Test Strip Die D412(SIT)

For making tensile test samples, we make many types of slab molds. One is detailed at the right. These are plain or chrome finished. We usually stock molds for making adhesion, abrasion, flexing, compression and rebound test samples, but supply special molds promptly. We also furnish hand-forged tensile dies for cutting regular or tear test samples.

SLAB MOLD DIS-41


Mill 0.020" deep below depth of cavity
Cover Plate to be 0.50" Thick
Cavities to be 0.075 deep
0.515" Cover plate to be 0.50" thick
Mill four corners 6 deep for prying mold apart

**HOGGSON & PETTIS MFG. CO., 141A Brewery St., New Haven 7, Conn.**

*Pac. Coast: H. M. Royal, Inc., Los Angeles*

works equally well for...

# HOT or COLD

PROCESSING OF RUBBER SHEETING AND PRODUCTS

## HOLLISTON

# BRATEX

## RUBBER HOLLAND

BRATEX is available in three standard qualities, 20 and 40 inch widths, 100 and 250 yard rolls. Special size rolls to order.

**THE HOLLISTON MILLS, INC., NORWOOD, MASS.**

NEW YORK • PHILADELPHIA • CHICAGO • MILWAUKEE • SAN FRANCISCO

## REINFORCING AGENTS—CARBON BLACK

### Channel, Hard Processing (HPC) (bags)

| | | | |
|---|---|---|---|
| Atlantic HPC-98* | lb. | .0725 - | .1400 |
| Continental F* | lb. | .0725 - | .1400 |
| Croflex* | lb. | .0725 - | .1400 |
| Dixiedensed (and S)* | lb. | .0725 - | .1400 |
| Kosmobile (and S)* | lb. | .0725 - | .1400 |
| Micronex HPC* | lb. | .0725 - | .1400 |
| Witco No. 6* | lb. | .0725 - | .1400 |

### Channel, Medium Processing (MPC) (bags)

| | | | |
|---|---|---|---|
| Arrow MPC* | lb. | .0725 - | .1300 |
| Atlantic MPC-95* | lb. | .0725 - | .1400 |
| Continental A* | lb. | .0725 - | .1400 |
| Croflex TH* | lb. | .0725 - | .1400 |
| Dixiedensed HM (and S-66) | lb. | .0725 - | .1400 |
| Kosmobile HM (and S-66) | lb. | .0725 - | .1400 |
| Micronex Standard* | lb. | .0725 - | .1400 |
| Spheron 6* | lb. | .0725 - | .1400 |
| Texas M* | lb. | .0725 - | .1400 |
| Witco No. 1* | lb. | .0725 - | .1400 |

### Channel, Easy Processing (EPC) (bags)

| | | | |
|---|---|---|---|
| Atlantic EPC E-42* | lb. | .0725 - | .1400 |
| Collocarb* | lb. | .0590 - | .1400 |
| Continental AA* | lb. | .0725 - | .1400 |
| Croflex 77* | lb. | .0725 - | .1400 |
| Dixiedensed 77* | lb. | .0725 - | .1400 |
| Kosmobile 77* | lb. | .0725 - | .1400 |
| Micronex W-6* | lb. | .0725 - | .1400 |
| Spheron 9* | lb. | .0725 - | .1400 |
| Texas E* | lb. | .0700 - | .1400 |
| Witco No. 12* | lb. | .0725 - | .1400 |
| Wyex EPC* | lb. | .0725 - | .1300 |

### Channel, Conductive (CC) (bags)

| | | | |
|---|---|---|---|
| Continental R-40* | lb. | .2400 - | .3200 |
| Dixie 5 Dustless* | lb. | .1200 - | .1900 |
| Dixie Voltex* | lb. | .2400 - | .3200 |
| Kosmink Dustless* | lb. | .1200 - | .1900 |
| Kosmos Voltex* | lb. | .2400 - | .3200 |
| Spheron C* | lb. | .1800 - | .2400 |
| Voltex* | lb. | .2400 - | .3200 |

### Channel, Surface Treated (STC) (bags)

| | | | |
|---|---|---|---|
| Texas 109* | lb. | .0790 - | .1275 |

### Conductive Furnace Black (CF) (bags)

| | | | |
|---|---|---|---|
| Aromex CF* | lb. | .0825 - | .1400 |
| Atlantic CF* | lb. | .0875 - | .1350 |
| Continex CF* | lb. | .1000 - | .1500 |
| Croflex CF* | lb. | .0875 - | .1350 |
| Dixie CF* | lb. | .0875 - | .1350 |
| Kosmos CF* | lb. | .0875 - | .1350 |
| Shawinigan Acetylene Black* | lb. | .1700 - | .2600 |
| Vulcan C* | lb. | .1050 - | .1700 |

### Extra-Conductive Furnace Black (ECF) (bags)

| | | | |
|---|---|---|---|
| Vulcan XC-72 | lb. | .1775 - | .2700 |

### Furnace, Fast Extruding (FEF) (bags)

| | | | |
|---|---|---|---|
| Arovel FEF* | lb. | .0625 - | .1200 |
| Continex FEF* | lb. | .0625 - | .1200 |
| Croflex 50* | lb. | .0625 - | .1200 |
| Dixie 50* | lb. | .0625 - | .1200 |
| Kosmos 50* | lb. | .0625 - | .1200 |
| Philblack A* | lb. | .0625 - | .1200 |
| Statex M* | lb. | .0625 - | .1200 |
| Sterling SO* | lb. | .0625 - | .1200 |

### Furnace, Fine (FF) (bags)

| | | | |
|---|---|---|---|
| Statex B* | lb. | .0675 - | .1250 |
| Sterling 99* | lb. | .0675 - | .1250 |

### Furnace, General Purpose (GPF) (bags)

| | | | |
|---|---|---|---|
| Arogen GPF* | lb. | .0550 - | .1125 |
| Dixie 35* | lb. | .0550 - | .1125 |
| Kosmos 35* | lb. | .0550 - | .1125 |
| Sterling V* | lb. | .0550 - | .1125 |
| V (Non-Staining) | lb. | .0500 - | .1125 |

### Furnace, High Abrasion (HAF) (bags)

| | | | |
|---|---|---|---|
| Aromex HAF* | lb. | .0725 - | .1300 |
| Continex HAF* | lb. | .0725 - | .1300 |
| Croflex 60* | lb. | .0725 - | .1300 |
| Dixie 60* | lb. | .0725 - | .1300 |
| Kosmos 60* | lb. | .0725 - | .1300 |
| Philblack O* | lb. | .0725 - | .1300 |
| Statex R* | lb. | .0725 - | .1300 |
| Vulcan 3* | lb. | .0725 - | .1300 |

### Furnace, High Modulus (HMF) (bags)

| | | | |
|---|---|---|---|
| Continex HMF* | lb. | .0575 - | .1150 |
| Croflex 40* | lb. | .0575 - | .1150 |
| Dixie 40* | lb. | .0575 - | .1150 |
| Kosmos 40* | lb. | .0575 - | .1150 |
| Modulex HMF* | lb. | .0575 - | .1150 |
| Statex 93* | lb. | .0575 - | .1150 |
| 930* | lb. | .0575 - | .1150 |
| Sterling L* | lb. | .0575 - | .1150 |
| LL* | lb. | .0575 - | .1150 |

## REINFORCING AGENTS—CARBON BLACK (Cont'd)

### Furnace, Semi-Reinforcing (SRF) (bags)

| | | | |
|---|---|---|---|
| Continex SRF* | lb. | .0525 - | .1100 |
| Croflex 20* | lb. | .0575 - | .1100 |
| Dixie 20* | lb. | .0525 - | .1100 |
| Essex SRF* | lb. | .0525 - | .1100 |
| Furnex* | lb. | .0525 - | .1100 |
| Gastex* | lb. | .0525 - | .1200 |
| Kosmos 20* | lb. | .0525 - | .1100 |
| Pelletex* | lb. | .0525 - | .1100 |
| NS* | lb. | .0525 - | .1100 |
| Shawinigan Acetylene Black* | lb. | .1700 - | .2600 |
| Sterling NS* | lb. | .0525 - | .1100 |
| R* | lb. | .0575 - | .1200 |
| S* | lb. | .0525 - | .1100 |

### Furnace Super Abrasion (SAF) (bags)

| | | | |
|---|---|---|---|
| Dixie 85 | lb. | .1125 - | .1650 |
| Kosmos 85 | lb. | .1125 - | .1650 |
| Philblack E* | lb. | .1125 - | .1550 |
| Vulcan 9* | lb. | .1125 - | .1800 |

### Furnace, Super Abrasion, Intermediate (ISAF) (bags)

| | | | |
|---|---|---|---|
| Aromex ISAF* | lb. | .0875 - | .1450 |
| Continex ISAF* | lb. | .0875 - | .1450 |
| Dixie 70* | lb. | .0875 - | .1450 |
| Kosmos 70* | lb. | .0875 - | .1450 |
| Philblack I* | lb. | .0875 - | .1450 |
| Statex 125* | lb. | .0875 - | .1450 |
| Vulcan 6* | lb. | .0875 - | .1450 |

### Furnace, Super Conductive (SCF) (bags)

| | | | |
|---|---|---|---|
| Vulcan SC* | lb. | .1800 - | .2450 |

### Thermal, Fine (FT) (bags)

| | | | |
|---|---|---|---|
| P-33 (c.l.)* | lb. | — - | .0575 |
| Sterling FT (c.l.)* | lb. | — - | .0575 |

### Thermal, Medium (MT) (bags)

| | | | |
|---|---|---|---|
| Shellblack*(†) | lb. | — - | .0250 |
| Sterling MT (c.l.)* | lb. | — - | .0400 |
| MT Non-Staining (c.l.)* | lb. | — - | .0500 |
| Thermax (c.l.)* | lb. | — - | .0400 |
| Stainless (c.l.) | lb. | — - | .0500 |

## REINFORCING AGENTS—SILICA

| | | | |
|---|---|---|---|
| Cab-O-Sil (compressed)* | lb. | .68 - | .75 |
| Cab-O-Sil (uncompressed)* | lb. | .68 - | .75 |
| D. C. Silica (pelletized)* | lb. | 1.45 - | 1.65 |
| Hi-Sil 101* | lb. | .11 - | .12½ |
| 233* | lb. | .09 - | .10½ |
| X303* | lb. | .40 - | .45 |
| Santocel* | lb. | .62 - | .64 |
| Valron Estersil* | lb. | 2.00 - | 2.25 |

## REINFORCING AGENTS—MISCELLANEOUS

| | | | |
|---|---|---|---|
| Angelo Shellac* | lb. | .50 - | .60 |
| Darex Copolymer No. 3* | lb. | .47 - | .49 |
| 43G* | lb. | .39 - | .41 |
| Darex Copolymer Latex No. 3-L | lb. | .41½ - | .46 |
| Durez 12687 (and 12707)* | lb. | — - | .38½ |
| Durez 13355* | lb. | — - | .30 |
| Good-rite Resin 50* | lb. | .39 - | .41 |
| Hystron* | lb. | .39 - | .41 |
| Kralac A-EP* | lb. | .39 - | .41 |
| Lampblack | lb. | — - | .12 |
| Marbon S and S-1* | lb. | .39 - | .41 |
| 8000* | lb. | .39 - | .41 |
| Marmix* | lb. | .39 - | .41 |
| Pliolite Latex 150* | lb. | .35 - | .39 |
| Pliolite Resin-Rubber Masterbatches* | lb. | .33 - | .57 |
| Pliolite NR* | lb. | .93 - | .95 |
| S6B* | lb. | .39 - | .41 |
| Plio-Tuf G85C* | lb. | .52 - | .54 |
| Polyco 220* | lb. | .18¼ - | .19¼ |
| Polypol S-70* | lb. | .22 - | .23 |

## RETARDERS

| | | | |
|---|---|---|---|
| Benzoic Acid TBAO-2°... | lb. | — - | .44 |
| Dutch Boy Normasal* | lb. | — - | .46 |
| ESEN* | lb. | .35 - | .37 |
| Good-rite Vultrol* | lb. | .62 - | .64 |
| Harcopol 1183* | lb. | .70 - | .74 |
| Retarder J* | lb. | .62 - | .64 |
| PD* | lb. | .37 - | .39 |
| W* | lb. | — - | .42 |
| Retardex* | lb. | .47 - | .50 |

## RUBBER SUBSTITUTES

### Mineral Rubber

| | | | |
|---|---|---|---|
| Byerlyte* | ton | 50.00 - | 57.00 |
| Hard Hydrocarbon (dms.)* | ton | 53.00 - | 55.00 |
| Herron Flake* | ton | — - | 45.00 |
| Mineral Rubber, Solid | ton | 42.50 - | 44.50 |
| M. R. No. 38* | ton | 55.00 - | 65.00 |
| Witresin | ton | — - | 52.50 |

### Vulcanized Vegetable Oils

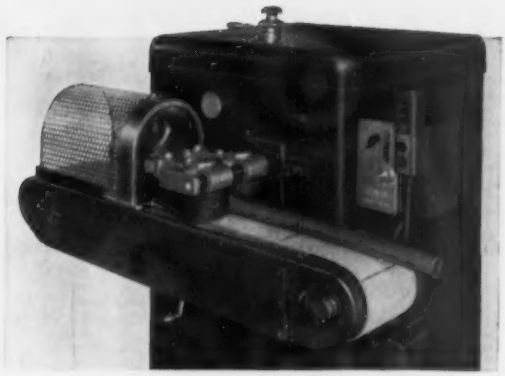
| | | | |
|---|---|---|---|
| Amberex* | lb. | .29 - | .36 |
| Brown | lb. | .15 - | .24 |
| Car-Bel-Lite* | lb. | .3000 - | .3300 |
| Neophax* | lb. | .17 - | .27 |
| Polyrez A and C* | lb. | .12 - | .17 |
| White | lb. | .15 - | .26 |

### Miscellaneous Rubber Substitutes

| | | | |
|---|---|---|---|
| G.B. Asphaltenes* | lb. | .06 - | .06½ |
| Gilsowax B* | lb. | .09 - | .11 |
| Resin No. 1098 (dms.) | lb. | — - | .62 |
| No. 1198* | lb. | .46¾ - | .49¾ |
| Tysonite* | lb. | .26 - | .26¾ |

## SOLVENTS

| | | | |
|---|---|---|---|
| Acetone (dlvd.) | lb. | .10½ - | .11½ |
| Amsco Lactol Spirits* (t.c.) | gal. | — - | .19 |
| Naphthol Spirits* | gal. | — - | .18 |
| Mineral Spirits* | gal. | — - | .17 |
| Rubber Solvent* (t.c.) | gal. | — - | .18 |
| Solv A* (t.c.) | gal. | — - | .24½ |
| Solv A-80* (t.c.) | gal. | — - | .30 |
| Solv B* (t.c.) | gal. | — - | .28½ |
| Solv B-90* (t.c.) | gal. | — - | .32 |
| Solv D* (t.c.) | gal. | — - | .30 |
| Solv E* | gal. | — - | .30 |
| Solv F* | gal. | — - | .30 |
| Solv F-80* | gal. | — - | .32½ |
| Solv G* | gal. | — - | .42½ |
| Special Naphtholite* (t.c.) | gal. | — - | .18 |
| Special Textile Spirits* | gal. | — - | .19 |
| Super Hi-Flash Naphtha* | gal. | — - | .35 |
| Super Naphtholite* | gal. | — - | .18 |
| Textile Spirits* (t.c.) | gal. | — - | .19 |
| Amyl Chlorides, Mixed (t.c.l.) (dms.) | lb. | — - | .11 |
| Benzol 90% | gal. | .36 - | .40 |
| Butyl Acetate (t.c.) | lb. | — - | .13½ |
| Butyl Alcohol (t.c.) | lb. | — - | .13½ |
| Secondary (dlvd.) | lb. | .14½ - | .15½ |
| Tertiary (dlvd.) | lb. | .14½ - | .15½ |
| Carbon Bisulfide, Tech. | lb. | .05½ - | .07½ |
| Carbon Tetrachloride | lb. | .10 - | .13½ |
| Cosol 1* | gal. | .37 - | .43 |
| 2* | gal. | .42 - | .48 |
| Cyclohexane | gal. | .55 - | .72 |
| 85% (c.l.) (dms.) | gal. | — - | .56 |
| Cyclohexanone | lb. | .29 - | .31½ |
| Diacetone, Pure (dlvd.) | lb. | .15 - | .16 |
| Dichlorethyl Ether (dms.) | lb. | .14½ - | .15 |
| Formal (dms.) | lb. | .30¾ - | .31¼ |
| Dichloropentanes (t.c.l.) (dms.) | lb. | — - | .06 |
| Dicom* | gal. | — - | .50 |
| Halowax Oil* | lb. | .28 - | .41 |
| Heptanes* (t.c.) | gal. | .19 - | .22 |
| Hexanes (t.c.) | gal. | .19 - | .22 |
| Isopropyl Alcohol, Ref. 99% (dlvd.) | gal. | .57 - | .64 |
| Ether, Ref. (dlvd.) | lb. | .09½ - | .10½ |
| Mersol* | gal. | .43 - | .79 |
| Mesityl Oxide (dlvd.) | lb. | .14½ - | .15½ |
| Methyl Acetone, Syn. (dms., dlvd.) | gal. | .57 - | .63 |
| Methyl Chloride | lb. | — - | .11½ |
| Methyl Ethyl Ketone | lb. | .14½ - | .15½ |
| Methyl Isobutyl Ketone (dlvd.) | lb. | .16½ - | .17½ |
| Methylene Chloride | lb. | .11¾ - | .16 |
| N-5 Pentane Mix* (t.c.) | gal. | — - | .13½ |
| N-6 Hexanes* (t.c.) | gal. | — - | .14½ |
| N-7 Hexanes* (t.c.) | gal. | — - | .13½ |
| Penetrell* | gal. | .40 - | .62 |
| Perchlorethylene | lb. | .11½ - | .14¼ |
| Petrolene* (t.c.) | gal. | — - | .14125 |
| Picolines, Alpha, Refined | lb. | .43½ - | .44 |
| Mixed | lb. | .32½ - | .33 |
| Proprietary Solvent (dms.) | gal. | .66 - | .77 |
| Propyl Acetate (t.c., dlvd.) | lb. | — - | .11¾ |
| Alcohol (t.c., dlvd.) | lb. | — - | .11 |
| PT 150 Pine Solvent* (dms.) | gal. | — - | .44 |
| Pyridine, Refined | lb. | .74½ - | .75 |
| Quinoline | lb. | .50 - | .54¼ |
| Rubber Solvent (t.c.) | gal. | — - | .16 |
| Rubsol (t.c.) | gal. | — - | .12875 |
| Skellysolve B (Hexanes)* (t.c.) | gal. | — - | .158 |
| C (Heptanes)* (t.c.) | gal. | — - | .151 |
| R (Rubber Solvent)* | gal. | — - | 1.29 |
| Solvent, Crude, Light | gal. | .19 - | .28 |
| Solvesso 100* (t.c.) | gal. | .33 - | .35 |
| 150 (t.c.) | gal. | .33 - | — |
| Sunny South DD Dipentine* | gal. | .40 - | .62 |
| Sunny South DD Pine Oil* | lb. | .12¼ - | .14¼ |



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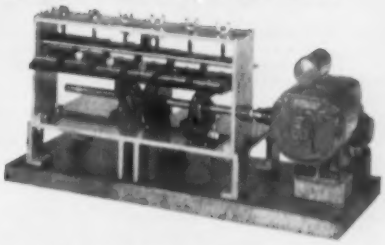
(for ASTM D1052)



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## SOLVENTS (Cont'd)

| | | | |
|---|---|---|---|
| **Sunray*** | gal. | .1140 | .1600 |
| **Toluene (dms.)** | gal. | — | .38 |
| Toluol (t.c.) | gal. | .33 | .35 |
| **Trichlorethane** | lb. | .13 | .13½ |
| **Triglycol Dichloride** | lb. | .63 | .64 |
| Union Thinner 1* (t.c.) | gal. | — | .174 |
| 5* (dms.) | gal. | — | .199 |
| 7* (t.c.) | gal. | — | .164 |
| **2-50 W Hi-Flash*** | gal. | — | .41 |
| **Xylol** | gal. | .34 | .38 |

## STABILIZING AGENTS (for Vinyl Resins)

| | | | |
|---|---|---|---|
| Advastab BC-12* | lb. | .90 | .95 |
| BC-74* | lb. | .70 | .75 |
| BC-105* | lb. | .75 | .80 |
| CH-101* | lb. | .60 | .65 |
| CH-201* | lb. | .60 | .65 |
| E-82* | lb. | .90 | .95 |
| JCX* | lb. | .62 | .67 |
| L Paste* | lb. | .65 | .70 |
| SN* | lb. | .47 | .52 |
| T-10* | lb. | 1.90 | 1.95 |
| T-50-LT* | lb. | 3.20 | 3.25 |
| XBZ-155* | lb. | .69 | .74 |
| XC-143* | lb. | .90 | .95 |
| XE-98* | lb. | .53 | .58 |
| Barca 10* | lb. | .75 | .80 |
| **Barium Ricinoleate (BVS)** | lb. | — | .70 |
| Barium Stearate | lb. | .39 | .44 |
| Basic Silicate White Lead | lb. | .20¾ | .21¾ |
| **Cadmium Ricinoleate** | lb. | — | 2.00 |
| **Calcium Ricinoleate** | lb. | — | .55 |
| **Dutch Boy DS-207*** | lb. | — | .54 |
| **Plumb-O-Sil A*** | lb. | — | .29¾ |
| **B*** | lb. | — | .31¾ |
| **Tribase*** | lb. | — | .26½ |
| **Dythal*** | lb. | — | .39½ |
| Ferro 182* (dms.) | lb. | .70 | .76 |
| **200* (dms.)** | lb. | 1.33 | 1.43 |
| 203* (dms.) | lb. | .85 | .95 |
| 541* (dms.) | lb. | .35½ | .45½ |
| 541A* (dms.) | lb. | .81¾ | .91¾ |
| **700* (dms.)** | lb. | .48¾ | .58¾ |
| 900* (dms.) | lb. | .90 | 1.00 |
| 903* (dms.) | lb. | .55 | .65 |
| 909* (dms.) | lb. | .91 | 1.01 |
| **920*** | lb. | — | .98 |
| **931* (dms.)** | lb. | .75¾ | .85¾ |
| 993* (dms.) | lb. | .89 | .99 |
| 1203* (dms.) | lb. | 1.30 | 1.40 |
| 1206* (dms.) | lb. | 1.23 | 1.33 |
| 1820* (dms.) | lb. | .90 | 1.00 |
| 1825* (dms.) | lb. | 1.00 | 1.10 |
| Permyl A | lb. | .45 | .55 |
| **Harshaw 1-V-3*** | lb. | — | .43 |
| **1-V-4*** | lb. | — | .68 |
| 1-V-7* | lb. | — | .66 |
| 2-V-4* | lb. | — | .90 |
| **2-V-7*** | lb. | — | 1.10 |
| **2-V-8*** | lb. | — | 1.30 |
| **5-V-1*** | lb. | — | .41 |
| **7-V-1*** | lb. | — | .90 |
| 8-V-1* | lb. | — | 1.15 |
| **8-V-5*** | lb. | — | .80 |
| 8-V-100* | lb. | — | .84 |
| 9-V-1* | lb. | — | .76 |
| **12-V-5*** | lb. | — | .75 |
| **24-V-1*** | lb. | — | 1.28 |
| **28-V-2*** | lb. | — | 1.18 |
| **128-V-5*** | lb. | — | .86 |
| Lithium Stearate | lb. | .52 | .57 |
| Fluffy | lb. | .47½ | .70 |
| Standard | lb. | .52½ | .75 |
| Mark C* | lb. | .88 | .90 |
| E* | lb. | .72 | .75 |
| M* | lb. | .68 | .70 |
| PL* | lb. | .63 | .65 |
| TT* | lb. | .72 | .75 |
| WS* | lb. | .98 | 1.00 |
| X* | lb. | 2.50 | 2.75 |
| XI* | lb. | .87 | .90 |
| XV* | lb. | .88 | .90 |
| XX* | lb. | .58 | .60 |
| **Metasap 613-A*** | lb. | — | .69 |
| **613-B*** | lb. | — | .84 |
| **613-C*** | lb. | — | 1.06 |
| **621*** | lb. | — | .88 |
| **624*** | lb. | — | .75 |
| **633*** | lb. | — | .75 |
| **635*** | lb. | — | .45 |
| **Modicol N*** | lb. | .41½ | .42½ |
| **S*** | lb. | .30½ | .31½ |
| Sodium Silicates 41°/1:32 | cwt. | 1.00 | 2.10 |
| **Stabelan E*** | lb. | 1.35 | 1.50 |
| **XL*** | lb. | .55 | .65 |
| **HR-50*** | lb. | .75 | .90 |
| **HR Liquid*** | lb. | .65 | .75 |
| **HR Paste*** | lb. | .85 | .95 |
| **HR Powder*** | lb. | .95 | 1.05 |
| No. 110 Liquid | lb. | .65 | .75 |
| No. 115 Liquid | lb. | .85 | .95 |
| No. 120 Liquid | lb. | .65 | .75 |
| Stabilizer No. 52* | lb. | 1.90 | 2.00 |
| 89X* | lb. | .75 | .80 |
| B-5* | lb. | — | .70 |
| E6B* | lb. | — | .95 |
| G-1* | lb. | 1.25 | 1.40 |
| HR* | lb. | .85 | .89 |
| I* | lb. | — | .60 |
| OM-10* | lb. | — | 1.95 |
| **Staflex OY*** | lb. | 1.00 | 1.20 |
| **QXMA*** | lb. | — | .70 |

## STABILIZING AGENTS (Cont'd)

| | | | |
|---|---|---|---|
| Stayrite 10* | lb. | .34 | .36 |
| P-10* | lb. | .41 | .43 |
| 15* | lb. | .53 | .58 |
| 20* | lb. | .37 | .42 |
| 22* | lb. | 1.00 | 1.13 |
| 25* | lb. | .35 | .40 |
| 70* | lb. | .68 | .70 |
| 71* | lb. | .88 | .90 |
| 75* | lb. | .59 | .62 |
| 76* | lb. | .53 | .55 |
| 80* | lb. | .68 | .70 |
| 90* | lb. | .68 | .70 |
| 95* | lb. | .68 | .70 |
| 229* | lb. | .45 | .50 |
| Vanstay C-73* | lb. | .63 | .65 |
| HT* | lb. | .90 | .92 |
| L* | lb. | .33 | .35 |
| N* | lb. | .98 | 1.00 |
| R* | lb. | .70 | .72 |
| S* | lb. | .63 | .65 |
| Z* | lb. | .67 | .69 |

## STIFFENING AGENTS

| | | | |
|---|---|---|---|
| Polyac* | lb. | — | 1.80 |
| Processing Stiffener 710* | lb. | — | .88 |
| Solvitose HDF, H. C-S, T, and E* | lb. | .22 | .25 |
| Versatil Gum 8-E* | lb. | .15 | .19 |

## SUN CHECKING AGENTS

| | | | |
|---|---|---|---|
| Allied AA-1144* | lb. | .23 | .24 |
| AA-1177* | lb. | .15½ | .16½ |
| Antisol* | lb. | — | .23 |
| Antisun* (Chipped) | lb. | .15½ | .17½ |
| (Slabbed) | lb. | .15 | .17 |
| Heliozone* | lb. | .31 | .32 |
| Microflake* | lb. | .20 | .24 |
| Nacconol NRSF* | lb. | .40½ | .45 |
| NBC* | lb. | — | 1.55 |
| Ross Sunproofing Waxes* | lb. | — | .14½ |
| Sunolite* | lb. | .16 | .22 |
| 127* | lb. | .16½ | .20½ |
| 154* | lb. | .23 | .25 |
| Sunproof* | lb. | .31 | .32 |
| 713* | lb. | .25 | .26 |
| Improved* | lb. | .25 | .26 |
| Super* | lb. | .40 | .41 |
| Jr.* | lb. | .20 | .21 |
| Tonox* | lb. | .52 | .54 |

## SURFACE ACTIVE AGENTS

| | | | |
|---|---|---|---|
| Anhydrapent* | lb. | .56 | .59 |
| Anhydrol 6990* | lb. | .51 | .56 |
| 6991* | lb. | .51 | .56 |
| Aquarex D* | lb. | — | .78 |
| G* | lb. | — | .21 |
| MDL* | lb. | — | .33 |
| ME* | lb. | — | .80 |
| NS* | lb. | — | .60 |
| SMO* | lb. | — | .50 |
| WAQ* | lb. | — | .22 |
| Emulphor EL-620* | lb. | — | .40 |
| EL-719* | lb. | — | .58 |
| ON-870* | lb. | — | .55 |
| Igepal CA-630 | lb. | — | .29 |
| CO-630 | lb. | — | .29 |
| CO-730 | lb. | — | .29 |
| CO-850* | lb. | — | .29 |
| CO-880* | lb. | — | .29 |
| Igepon CN-42* | lb. | — | .25 |
| T-33* | lb. | — | .21 |
| T-51* | lb. | — | .13½ |
| T-77* | lb. | — | .49 |
| Kessco 50201* | lb. | — | .43½ |
| 50203* | lb. | — | .46 |
| 18201* | lb. | — | .36½ |
| 18203* | lb. | — | .36 |
| Pluronic L62* | lb. | .33½ | .39 |
| L64* | lb. | .33½ | .39 |
| Sellogen Gel* | lb. | — | .12¾ |
| Soybean Lecithin | lb. | .13 | .17 |

## TACKIFIERS

| | | | |
|---|---|---|---|
| Amalgamator Z-4* | lb. | .32 | .33 |
| Arcco 620-32B* | lb. | .20½ | .21½ |
| 716-30* | lb. | .18½ | .19½ |
| 1041-21* | lb. | .16½ | .17½ |
| A-26* | lb. | .18 | .19 |
| Bunaweld Polymer No. 780* | lb. | — | .24 |
| No. 5514* | lb. | — | .35 |
| Galex* (dms.) | lb. | .17¾ | .18¾ |
| Indopol H-300* | gal. | 1.00 | 1.22 |
| Koresin* | lb. | — | .95 |
| Liquid Rubber Flux* | lb. | — | .14 |
| Nacconal NRSF* (dlvd.) | lb. | .40½ | .45 |
| Nilox Resin* (c.l.) | cwt. | — | 14.50 |
| Resin V | lb. | — | .23½ |
| Synthol* | lb. | .17 | .24¼ |
| Vistac A* | lb. | .21½ | .22¼ |
| Vistanex LM Grades* | lb. | — | .45 |
| Zirex* (c.l.) | cwt. | — | 14.75 |

## THICKENERS (For Latex)

| | | | |
|---|---|---|---|
| Alcogum AN-6* | lb. | — | .05 |
| AN-10* | lb. | — | .08½ |
| PA-10* | lb. | — | .12 |
| Betanol* (dms.) | lb. | .70 | .95 |
| Gomme Labolene* | lb. | .45 | .47 |
| Good-rite K-702* | lb. | .34½ | .35 |
| K-704* | lb. | .21 | .22 |
| K-705* | lb. | .31 | .32 |
| K-707* | lb. | .18 | .19 |
| K-708* | lb. | .29 | .30 |
| K-710* | lb. | .15 | .16 |

## THICKENERS (For Latex) (Cont'd)

| | | | |
|---|---|---|---|
| Modicol VD* | lb. | .13⅜ | .14⅜ |
| VE* | lb. | .13⅜ | .14⅜ |
| Polyco 296 BT* | lb. | .15 | .16 |
| 296-N* | lb. | .15 | .16 |
| 530* | lb. | .15 | .16 |
| Propylene Laurate (dms.) | lb. | .57 | .82 |
| Sodium Silicate, 41°/1:3.2 | cwt. | 1.10 | 2.20 |
| Solvitose Series* | lb. | .22 | .25 |

## VULCANIZING AGENTS

**Selenium**

| | | | |
|---|---|---|---|
| Vandex* | lb. | — | 15.50 |

**Sulfur**

| | | | |
|---|---|---|---|
| Aero Brand* (c.l.) | cwt. | — | 2.65 |
| Blackbird* (c.l.) | cwt. | — | 2.85 |
| Cloud* (c.l.) | cwt. | — | 2.80 |
| Crystex* | lb. | .19½ | .23 |
| Darex Dispersed Sulfur* | lb. | .14 | .16 |
| Devil A* (c.l.) | cwt. | — | 2.40 |
| Dispersed Sulfur | lb. | .14 | .16 |
| Insoluble Sulfur 60* | lb. | .12½ | .13 |
| Ko-Blend 1S* | lb. | — | .39 |
| Mist* (Wettable) (c.l.) | cwt. | — | 4.00 |
| Spider* (c.l.) | cwt. | — | 2.80 |
| Star* (c.l.) | cwt. | — | 3.25 |
| Sulfasan R* | lb. | — | 1.50 |
| Tire* (c.l.) | cwt. | — | 2.40 |
| Tube* (c.l.) | cwt. | — | 3.25 |
| Vultac 2* | lb. | .47 | .49 |
| 3* | lb. | .51 | .53 |

**Tellurium**

| | | | |
|---|---|---|---|
| Tellloy* | lb. | — | 2.50 |

## WETTING AGENTS

| | | | |
|---|---|---|---|
| Advawet No. 10* | lb. | — | .17 |
| No. 33* | lb. | — | .48 |
| Aerosol 18* | lb. | — | .40 |
| AY* | lb. | 1.00 | 1.20 |
| MA 80%* | lb. | .67 | .72 |
| OS* | lb. | .39 | .45 |
| OT 75% Aqueous* | lb. | .63 | .68 |
| OT 100%* | lb. | 1.00 | 1.20 |
| OT-B* | lb. | .85 | 1.05 |
| Alrosal* (dms.) | lb. | — | .40 |
| Alrosperse* | lb. | — | .18 |
| Anhydrol 6990* and 6991* | lb. | .51 | .56 |
| Areskap 50* | lb. | .30 | .32 |
| Dry 100* | lb. | .60 | .64 |
| Aresket Dry 300* | lb. | .60 | .64 |
| Aresklene 375* | lb. | .42 | .47 |
| Armacs* | lb. | .28 | .77 |
| Arquads* | lb. | .42 | .61 |
| Emcol 5100* (dms.) | lb. | — | .31 |
| Energetic W-100 | lb. | .28½ | .35 |
| Etho-Chemicals* | lb. | .26 | .58 |
| Ethomeen S/15* | lb. | .48 | .50 |
| T/15* | lb. | .46 | .48 |
| Kesco E-122* (dms.) | lb. | — | .45 |
| 18201* | lb. | — | .38½ |
| Kreelon 4D* (dms.) | lb. | .13 | .16 |
| 8G* (dms.) | lb. | .26 | .28 |
| Kyro EO* (dms.) | lb. | — | .29¾ |
| Modicol N* | lb. | .41½ | .42½ |
| S* | lb. | .30½ | .31½ |
| Nacconol SL* (dlvd.) | lb. | .084 | .10 |
| 60S* (dlvd.) | lb. | .19 | .225 |
| Nacconol A* (dlvd.) | lb. | — | .52 |
| Nekal WS-25 | lb. | — | .38 |
| WS-99 | lb. | — | .95 |
| Orvus AB Granules* | lb. | .15¾ | .16¾ |
| Parnol* | lb. | .13 | .18 |
| Regal Beads | lb. | .12¾ | .16¾ |
| H. D. Beads | lb. | .12¾ | .15¾ |
| Santomerse No. 3 | lb. | .41 | .45 |
| S* | lb. | 1.55 | 1.85 |
| Selapon Gel* | lb. | — | .13 |
| Sorapon SF-73* | lb. | — | .18 |
| SF-78* | lb. | — | .30 |
| Sorbit P* | lb. | — | .28 |
| Soybean Lecithin | lb. | .13 | .17 |
| Stablex G* | lb. | .50 | .90 |
| Tergitol 4* (dms., dlvd.) | lb. | .32 | .33 |
| 7* (dms., dlvd.) | lb. | .43 | .44 |
| O8* (dms., dlvd.) | lb. | .31 | .32 |
| P28* (dms., dlvd.) | lb. | .18½ | .19 |
| Trenamine W-30 | lb. | — | .15 |
| Vultamol* | lb. | — | .17½ |
| Wetsit Conc.* | lb. | .25 | .28 |

## MISCELLANEOUS CHEMICALS

| | | | |
|---|---|---|---|
| Aquesperse 30* | lb. | — | .11 |
| Arccopel W-18* | lb. | .17 | .19 |
| Asbury Graphite* | lb. | .05 | 1.45 |
| Copper Inhibitor X-872-L* | lb. | — | 2.01 |
| D-Tac* | lb. | — | .22 |
| 2-Ethyl Hexanol | lb. | .23¾ | .24¾ |
| Fura-Tone Resin 1226* | lb. | .41 | .43 |
| MODX* | lb. | .32½ | .34½ |
| Nacconates* (dms.) | lb. | .99 | 3.53 |
| Para Resins* | lb. | .04 | .04½ |
| Pigmented Filmite* (dlvd.) | lb. | .16¾ | — |
| Resorcin, Tech. | lb. | .77½ | .81½ |
| Rio Resin* | lb. | .65 | .67 |
| Rongalite CX* | lb. | — | .21½ |
| Sherosopes* | lb. | .13½ | .18¾ |
| Sublac Resin PX-5* | lb. | .23½ | .24½ |
| Synpep* | lb. | .54 | .60 |
| Thiokol LP-2* | lb. | — | .96 |
| LP-3, LP-32, LP-33* | lb. | — | .96 |
| LP-8* | lb. | 1.25 | 1.35 |
| Tysonite* | lb. | .26 | .26¾ |
| VA-7* | lb. | — | .50 |
| Vanfre* | gal. | 2.50 | 3.00 |

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*"Help Wanted" continued on next page*


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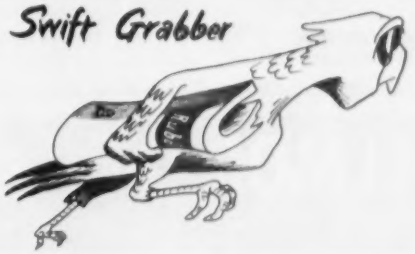

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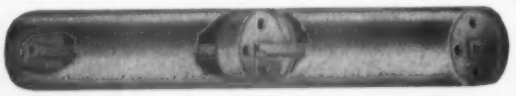

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### DIE CASTING MACHINES

Loch Engineering, zinc, motor drive 10 HP.

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NRM, 1½", elec. htd., wire coating, payoff and takeup.
1½", elec. htd., laboratory extruder, 2 HP vari-drive.
Royle No. 1, 2" screw, 15 HP, MD.
Hartig, 2", elec. htd., 7½ HP Reliance V-S drive, 98% new.
MPM, 3½", new 1955 with sheeting dies and takeup rolls.
Royle No. 1, 3 stage oil heated, excellent condition.
Hartig, 3¼", elec. htd., 45" barrel, 20 HP Reliance V-S drive.
No. 2 Royle, 15 HP motor, 3½" screw, elec. htd. die head.
No. 3 Royle, 30 HP motor drive, 4½" screw, side delivery, Q.O. head.
Allen Williams, 6" pelletizing head, 60 HP, MD.
NRM, 2½" with oil heating system, 7½ van speed dr.

### INJECTION MOLDING MACHINES

1 oz. Van Dorn, model H-200.
2 oz. HPM, No. 54 clamp, 22 ton, injection 12 ton, manual controls.
2 oz. NRK, manually operated, lab type.
2 oz. Watson-Stillman, frame 6 oz. cap., motor drive 20 HP, 1945.
2 oz. Van Dorn, oversize cylinder, model H-200.
3 oz. Fellows, fully automatic.
4 oz. DeMattia, semi-automatic.
4 oz. Crown moldmaster, complete, fully automatic.
4 oz. Reed-Prentice, Wheelco controls, 15 HP, MD.
6 oz. Watson-Stillman with 2 Wheelco controls.
8 oz. Reed-Prentice, double toggle.
8 oz. Watson-Stillman, semi-automatic, 40 HP, MD.
8 oz Impco, mdl. VF-3, compress. & transf. features, extra 12 oz. cyl.
9 oz. HPM, 200 ton, fully automatic.
16 oz. Reed-Prentice, No. 10-E-16, elec. htd., 1948.
22 oz. Impco, model VF 8-22.

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1 ton, Denison, 1½ HP, MD.
2 ton, Denison, 3 HP, MD.
5 ton, Logan, twin ram, 7½ HP, MD.
15 ton, Baker, fully automatic.
15 ton, Stokes No. 200 D-2, automatic (10).
15 ton, Consolidated, self-contained.
15 ton, Stokes, 200 D-3.
20 ton, Elmes No. 3429P laboratory, electrically heated platens 8" x 8".
25 ton, Dunning & Boschert, elec. htd., 16" x 16" platen, 12" DLO.
25 ton, Consolidated, 24" x 30", self-contained pump & motor.
30 ton, Watson-Stillman laboratory, platens 8" x 8" (2).
30 ton, Watson-Stillman, 4½" ram x 18" stroke, 12½ LR-16", F-B 22" DLO, MD.
30 ton, Baker, full automatic model 958, excellent condition, new 1951.
30 ton, HPM, upmoving, 12" x 12" platen, 12" DLO 12" str., with controls.
35 ton, HPM, down-acting, ram 6" x 6" str., bed 12" x 6", DLO 15", self-cont.
40 ton, Francis, 4 opening, 12" x 12" elec. heated platens.
40 ton, Loomis, 4 opening, 12" x 12" elec. heated platens, MD, self-cont.
50 ton, Baldwin-Southwark, angle molding press, practically new.
50 ton, Bliss, 20" x 20" platen, 20" str., 60 HP, MD.
50 ton, Stokes, semi-auto., self-cont.
50 ton, Farrel, 12" x 12", upmoving.
50 ton, Watson-Stillman, 12" x 17", elec. htd. platens, MD pump.
60 ton, 2 rod construction, 9" upmoving ram x 24" str., 35 L-R 30" F-B.
60 ton, Elmes, hydr. straightening press.
60 ton, Logan, horizontal extrusion press, 7" ram x 36" stroke.
75 ton, Farquhar, upacting, 30" x 42" platens.
100 ton, Farquhar, drawing, stroke 36", hi-speed appr., press, return.
100 ton, Stokes-standard, semi-automatic power system, timing controls.
100 ton, Watson-Stillman, platens 13" x 13", ram 3½" x 3" str., MD pump.
100 ton, HPM, 72" str. piston 30" x 30" DLO, fast acting.
100 ton, Watson-Stillman, 4-post, platens 11¾" x 12", ram 8" x 15" stroke.
100 ton, Watson-Stillman, bed 22" x 20", DLO 24", self-cont.
100 ton, Baldwin, down-acting, 12" ram x 12" str., 36" x 36" bed.
100 ton, Lake Erie, hi-speed, 24" x 24" bed, 12" DLO, self-cont.
113 ton, French Oil Mill, 6 opening, elec. htd. platens 15" x 18".
113 ton, R. D. Wood, 5 opening, elec. htd. platens 14" x 20".
113 ton, Stewart Bolling, 20" x 20", steam platens, 12" upmoving ram x 14" str.
150 ton, Stokes-standard, semi-automatic power system, timing controls.
150 ton, Carey, platens 20" x 16" adj., DLO 8"-28".
175 ton, Viceroy slab-side 24" x 24" elec. htd., platen with hand pump.
200 ton, Stokes, semi-automatic power system, timing controls.
200 ton, Elmes, 14" ram x 42" str., 24" x 30" bed.
225 ton, Farrel, 4" ram x 18" stroke, L-R 26½" x F-B 24½", 7½ HP, MD.
275 ton, Watson-Stillman, up-acting, 24" x 54" platens, 2-14" rams.
300 ton, Stokes, semi-automatic power system, timing controls.
625 ton, Farrel, steam platens 52" x 52", pump, mtr., controls, under power.
669 ton, Morane, 3 upmoving rams, 16" stroke.
1200 ton, HPM, 15 openings, 100" x 120" steam platens, self-cont. (2).
2000 ton, Birdsboro, down-acting, self-cont., bed 53" x 144", 2-29" rams by 30" stroke.
2400 ton, Birmingham, belt press, 65" x 25'6", 24-11" rams.
4000 ton, Mesta, 3 upmoving 30" rams x 20" str., bed 34" x 351".

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Despatch mdl. Diaz-7583, 3 drawers, 17" x 17" x 5" (2).
Despatch mdl. Plhd-S, 8 drawers, 12 x 18 x 2½" (2).
Thermonic Induction Heater, model M-285, 12KVA at full load.
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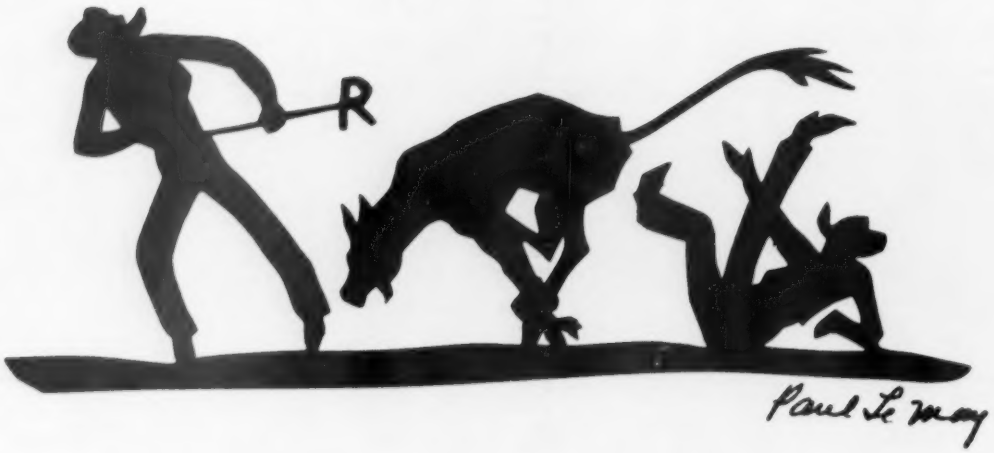


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